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**USING THE REVISED WILSON AND CLEARY MODEL TO EXPLORE
FACTORS AFFECTING QUALITY OF LIFE (QoL) IN PATIENTS WITH
CUTANEOUS LUPUS ERYTHEMATOSUS (CLE)**

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by

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Dissertation

Presented to the Faculty of the Graduate School of
The University of Texas at Austin
in Partial Fulfillment
of the Requirements
for the Degree of

Doctor of Philosophy

The University of Texas at Austin

May 2017

Dedication

To Mummy & Daddy: as always, and forever

Acknowledgements

“Man’s main task in his life is to give birth to himself, to become what he potentially is, the most important product of his effort is his own personality.”

-Erich Fromm, Psychologist

The quote above has a very deep meaning to me as it captures my sojourn so far in the U.S. I arrived five years ago, a little wet behind the ears, to advance myself personally, professionally, academically through the pursuit of a doctoral degree.

I would like to first and foremost thank God, for only through his grace, mercy and strength, did I survive this journey. “I can do all things through Christ who strengthens me” (Philippians 4:13). I also thank God for keeping my faith especially when life through enormous curveballs at me. I count myself indeed fortunate and blessed to have worked with incredible people, and to have had great support from them. By virtue of these people in my life, I have been encouraged to keep striving to be a better version of myself. I am also deeply humbled by all I have gleaned throughout these years.

There are several people who have impacted my life in countless and positive ways that I could never fully express this appreciation enough with words. However, my sincere hope is that the following panegyrics can, to some degree, convey my deepest and heartfelt gratitude to each and every one of them.

The research work behind this dissertation was completed with an intellectually stimulating community of seasoned researchers and scientists from diverse disciplinary

backgrounds. The discussions that helped shape the study from conception to completion have profoundly influenced my thoughts about patient care, rare diseases, quality of life, rigor statistical analyses. To my mentor/supervisor/dissertation chair, Dr. Carolyn M. Brown, I am truly grateful for all the dialogues we had regarding this study. She has been exceedingly generous in sharing her expertise, resources, support, and time. She also undertook the time-consuming process of editing my dissertation. I would also like to thank my dissertation committee, Dr. Jamie C. Barner, Dr. Kenneth A. Lawson, and Dr. Timothy Z. Keith, for their insights on data analyses and helping me think of the bigger picture. I would like to thank Dr. Benjamin F. Chong for taking a chance on me when I reached out to him two years ago to collaborate. I appreciate his expertise and valuable advice on dermatology and clinical practice.

Few things in life are achieved through solitary efforts; I have received so much practical and emotional support from family, friends, colleagues, and mentors. There is a saying in Korea that “백 개의 심장도 너를 향한 내 모든 사랑을 담기에는 너무 모자랄거야” which loosely translates to “A hundred hearts would be too few to carry all my love for you.” This is dedicated to my husband, my most intimate friend and life companion, whom I not only want to dedicate this dissertation to, but also share every one of my accomplishments with. I thank him for his unwavering belief in me, even when I had only little in myself. I only hope to continue to strive to live up to my full potential as he has always been helping me to.

In researching quality of life and health, I have also been influenced by many other people including students and staff in the Health Outcomes and Pharmacy Practice

Division of the University of Texas at Austin, and the University of Texas Southwestern Medical Center. Thus, I would like to thank Stephanie Crouch for all she has been to me since my first day here in Austin; she has been a reliable source of support. I would also like to thank Dean Ginsburg who has been a tremendous source of support in completing this dissertation. To my HOPP colleagues especially Benita Bamgbade, Chisom Chimah, Hyeun Ah (현아) Kang, Poojee Sudhapalli, Sanket Shah, and Xiaojing Ma – thank you for all the support!

I would also like to thank Fiona Imarhia and Christina Maxey for helping with the data transcription process, and Danielle Lin, Rose Cannon, Andrew Hudson, Jorge Hinojosa, Elaine Kunzler, and Jack O’Brien for assistance with administrative duties and patient recruitment.

I would be remiss if I did not thank these contact persons for allowing me to recruit patients: Dr. Vasquez from the Dermatology Clinic at Parkland Health and Hospital System and the contact persons at the Rheumatology Clinic. I am also indebted to the patients who graciously agreed to participate in this study. You know who you are: without you my lofty goals would have been *rarely* achieved.

May 2017

**USING THE REVISED WILSON AND CLEARY MODEL TO EXPLORE
FACTORS AFFECTING QUALITY OF LIFE (QoL) IN PATIENTS WITH
CUTANEOUS LUPUS ERYTHEMATOSUS (CLE)**

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The University of Texas at Austin, 2017

Supervisor: Carolyn M. Brown

Cutaneous lupus erythematosus (CLE) is a potentially disfiguring, chronic autoimmune disease with extremely variable skin manifestations, negatively impacting quality of life (QoL) of patients. This two-phase dissertation assessed factors associated with QoL in CLE patients, which may be used in specific interventions in improving QoL in this patient population.

Phase one entailed three focus groups (FGs) to capture the disease burden and QoL in patients with CLE (n=19). Four themes emerging as important factors: disease sequelae, social interactions, coping strategies, and unmet needs. Having CLE negatively affected mental health, and personal relationships, and led to negative coping strategies such as recreational drug use. Patients cited unmet needs including lack of treatments that improve chronic skin lesions and inadequate patient education on living with CLE.

Phase two was a cross-sectional survey in 57 patients to assess QoL and its correlates, using constructs within the Revised Wilson and Cleary Model. The dependent variables were operationalized as: a CLE-specific QoL measure, CLEQoL (CLEQoL-mental and CLEQoL physical) and the SF-36 (mental component summary

(MCS) and physical component summary (PCS)), yielding four separate regression models. From the CLEQoL models – mental and physical, the combination of fatigue and body image explained 71.0 and 73.0 percent of the variance in overall QoL, respectively; with body image being the strongest predictor [$\beta=0.64$; $p < 0.01$ (mental) and $\beta=0.49$, $p < 0.01$ (physical)]. For the SF-36 models – MCS and PCS, the model accounted for 54.0 and 69.0 percent of the variance in overall QoL, respectively. Pruritus ($\beta=-0.41$; $p < 0.05$), fatigue ($\beta=-0.29$; $p < 0.05$), race/ethnicity ($\beta=-0.23$; $p < 0.05$), and social support ($\beta=0.41$; $p < 0.01$) were significant predictors in the SF-36 MCS model. In the SF-36 PCS model, pain ($\beta=-0.35$; $p < 0.05$), fatigue ($\beta=-0.47$; $p < 0.01$), and race/ethnicity ($\beta=0.18$; $p < 0.05$) were significant predictors. These findings suggest that several modifiable (e.g., pain, pruritus, fatigue, body image, and social support) and non-modifiable (e.g., race/ethnicity) factors were predictive of overall QoL in CLE patients and could be used to help health care providers interpret and assess QoL outcomes in CLE patients.

These studies underscore several of the issues affecting QoL in CLE patients. Through the use of a theoretical framework, patient-centered and clinical outcomes were integrated to facilitate a fuller understanding of the several factors impacting QoL in CLE patients. As such, future studies aimed at understanding QoL in CLE patients could incorporate a multi-phase, multi-method approach using a theoretical framework.

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CHAPTER ONE: INTRODUCTION

This chapter delineates the overview of the disease, research problem, and study significance.

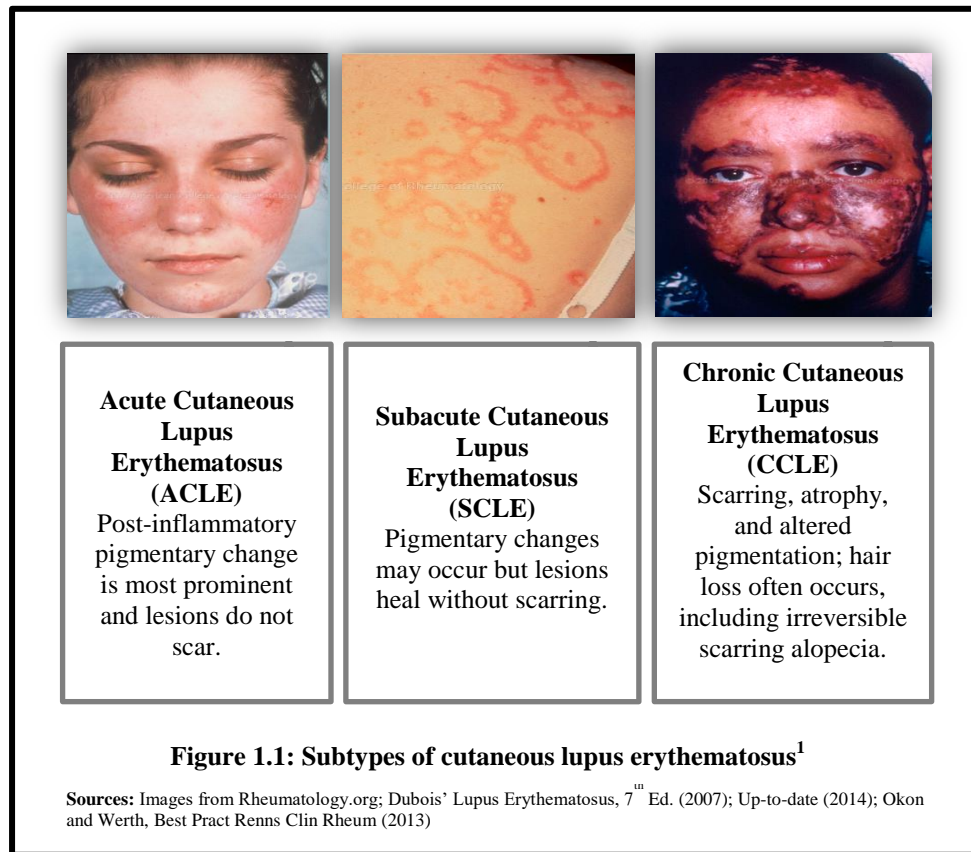
1.1 SYSTEMIC LUPUS ERYTHEMATOUS

Systemic lupus erythematosus (SLE) is a multi-system autoimmune disease and has changed in recent years from an often life-threatening disease with high rates of early mortality to a more chronic disease with increased life expectancy.⁴⁻⁷ SLE is most commonly seen in the African-American, Asian and Hispanic ethnicities.⁸ About nine out of 10 people with SLE are women (CDC 2012),⁹ with the disease primarily affecting them during their reproductive years. One possible explanation for the higher rates of SLE seen in women could be due to hormonal differences. Although not validated thoroughly by research, the hormonal theory may be the only logical explanation as to why women are diagnosed with SLE more often than men.^{10,11} A review of the global incidence data between 2006 and 2010 shows the estimated SLE incidence rates to be 1 to 25 per 100,000 in North America, South America, Europe, and Asia.^{12,13} Symptoms of SLE may include extreme fatigue, painful and swollen joints, swollen glands, facial rash, unexplained fever, hair loss, cognitive and memory impairments, depression, and other manifestations that detract from normal functioning.^{4,5}

1.1.1 CUTANEOUS MANIFESTATIONS OF SLE

Of the eleven American College of Rheumatology (ACR) diagnostic criteria for SLE,¹⁴ only four (malar rash, discoid lesions, oral ulcers, and photosensitivity) are cutaneous in nature, with many patients with cutaneous lupus erythematosus (CLE) showing little or no systemic symptoms. Such cases, with isolated cutaneous involvement, are referred to as CLE. The prevalence of SLE ranges from 15 – 46 per 100,000 with CLE occurring at a rate of 71 – 74 per 100,000 persons.¹⁵⁻¹⁸ CLE is diagnosed and managed by a dermatologist unless there is systemic involvement, as in SLE, in which case a rheumatologist and dermatologist may work together.¹⁹ Management of CLE centers on formulating a regimen of photoprotection, topical, and systemic therapies designed to reduce disease activity and cosmetic damage.

CLE is a chronic dermatologic autoimmune disease marked by photosensitive lesions that can vary in appearance depending on the subtype.^{20,21} The etiology of CLE is not fully understood, but it is speculated that genetic, hormonal, immunological abnormalities (e.g., cytokine, B-cells and T-cells dysfunction) and environmental factors (especially ultraviolet irradiation) might play a role.^{22,23} CLE is categorized into three main subgroups, including acute cutaneous lupus (ACLE), subacute cutaneous lupus (SCLE), and chronic cutaneous lupus (CCLE) [See Figure 1.1].



The vast majority of ACLE patients will develop SLE; however, fewer SCLE or CCLE patients will develop SLE. These CLE subsets are defined by clinical symptoms, the average duration of symptoms, and histological and serological findings.^{17,24} ACLE most often manifests as localized malar (butterfly) rash; erythema occurs over both cheeks and extends over the nasal bridge and spares nasolabial folds. ACLE is also frequently associated with systemic disease, and its lesions are photosensitive and quite transient, lasting only several days or weeks.¹⁷ SCLE is considered to be highly photosensitive and may be persistent; the most frequently-affected areas are shoulders, forearms, neck and upper torso while the face is usually spared.¹⁷ Furthermore, SCLE

has a rather fast onset and manifests as scaly annular erythematous plaques that tend to coalesce and produce the polycyclic array.

The most common subtype of CCLE is discoid lupus erythematosus (DLE); other variants exist but are considered to be rare.²⁵ DLE manifests as indurated erythematous plaques and papules that can result in significant scarring and alopecia.¹⁷ There is little mortality impact for DLE patients unless SLE or potentially severe co-morbidities develop (e.g., cancer).^{26,27}

DLE can also occur either in the localized or generalized form. The localized form, which is the most common type, involves the face, scalp, neck, and extensor aspect of arms; while the generalized form occurs both above and below the neck, and typically involves the extensor forearms and hands.¹⁷ DLE lesions are considered to be photosensitive and may be persistent, often forming larger confluent and disfiguring plaques. DLE is always limited to the skin. Many persons living with CLE wear protective clothing to shield themselves from the ultraviolet rays of the sun. These protective garments may include large hats and other head gear, face masks, or long sleeves.^{11,28} Thus photoprotective measures are a critical component of therapy, as ultraviolet A/B irradiation has been shown to induce lesions. Lesions are initially treated with topical/intralesional corticosteroids, and if persistent, systemic antimalarial therapies are used. However, approximately 25 percent of patients are refractory to antimalarials; therefore, immunosuppressants and biologics are the next lines of therapy.

1.2 IMPACT OF CLE ON QUALITY OF LIFE

While dermatologic diseases, in general, have been shown to have a significant impact on quality of life,^{29,30} there is limited information as to the extent in which CLE affects a patient's quality of life. Studies have reported that patients with dermatologic diseases are not only distressed about the disease itself but also how others perceive them as a result of their appearance.^{31,32} Consequently, dermatologic patients may experience higher rates of mental health conditions, especially anxiety and depression, with a prevalence ranging from approximately 20-40%, compared to 11-30% seen in the general population.³³⁻³⁵ CLE is perceived as being less severe and having a better prognosis than SLE; however in its chronic forms (e.g., DLE), it can last for several years and may lead to severe disability and permanent disfigurement.^{16,36} Moreover, CLE is a "chronic" condition that can be managed but not cured; therefore, patients are expected to visit their physicians regularly and are often placed on medications for a long period, many of which have serious side effects.²⁶ Due to the potential for irreversible skin damage and disfigurement in CLE, there is a high unmet need for therapies. Currently, there are no disease-modifying therapies for CLE, and thus there is an important need for therapies that prevent or reduce the size of CLE lesions, prevent flares and permanent skin damage, and/or minimize scarring.

Given the severity of the disease, CLE has a significant and distinct impact on the quality of life of such patients. A recent cross-sectional study of 117 patients with DLE reported that patients with DLE do experience significant quality of life impairment when compared to those without skin disease as well as those with a variety of other

skin diseases like rosacea, acne, and non-melanoma skin cancer. DLE patients were also found to be more highly affected by symptoms of itching and bleeding of their skin than patients with other forms of CLE. This study reported that some factors, such as female gender and smoking may be correlated with impairment of multiple domains of quality of life in DLE. However, the study used dermatologic measures that are not specific to CLE or DLE and, therefore, may not have captured all salient aspects of quality of life relevant to the experiences of DLE patients.³⁷

1.3 DISEASE ASSESSMENT

Disease activity and damage in SLE patients are measured by clinicians via the use of disease assessment tools. It is important to measure both disease activity and damage so as to: evaluate outcomes, observe differences in patient groups, estimate responses to therapy under investigation, and assess disease trends longitudinally for observational and clinical trials.³⁸ These tools are also called the SLE responder index (SRI). The Safety of Estrogens in Lupus Erythematosus – Systemic Lupus Erythematosus Disease Activity Index (SELENA-SLEDAI), the British Isles Assessment Group Instrument (BILAG), and the Physician’s Global Assessment (PGA) are common tools used to measure disease activity in SLE patients,³⁹⁻⁴³ while the Brief Index of Lupus Damage (BILD) and Lupus Damage Index Questionnaire (LDIQ) are used to quantify disease damage.^{44,45}

Although these SRIs have been used to assess some form of cutaneous manifestation, they do not measure skin-specific activity and damage – as seen in CLE.

To this end, the Cutaneous Lupus Erythematosus Disease Area and Severity Index (CLASI) was developed by dermatologists, using a framework of commonly-used tools in dermatology,⁴⁶ and has been validated against other cutaneous tools.^{47,48} The CLASI has been reported to be reliable and responsive to changes in cutaneous activity and damage;^{47,49} hence, it is increasingly used in clinical trials.⁵⁰ The CLASI activity score is based on erythema, scaling, mucous membrane involvement and alopecia with a range of 0–70, while the CLASI damage score is measured by dyspigmentation and scarring also with a possible range of 0–70. Disease severity in patients with CLE have been classified as mild (CLASI activity score, 0–9), moderate (10–20) or severe (≥ 21).⁴⁹

While clinician-reported outcome measures, such as CLASI, provide the clinician perspective on disease activity and damage, they do not measure the patient perspective. Given the impact of CLE on the quality of life of patients and the increasing prominence of patients' involvement in their care, it is important also to assess outcomes directly from the patients' perspectives.

1.4 PATIENT-REPORTED OUTCOME (PRO) MEASURES

PRO measures are increasingly used in clinical trials to measure the effects of treatments on patients. The relatively *objective* clinical outcome measures were traditionally considered in the clinical trials to evaluate therapies. More recently, *subjective* measures, such as PRO or 'humanistic' measures are now considered to be equally important. PROs are reports that are directly elicited from patients to assess

their health conditions, without interpretation of the patient's response by a clinician or anyone else.⁵¹ The Food and Drug Administration (FDA) recommends collection of PRO data during a clinical trial and use of PRO information in making conclusions about the treatment effect at the time of medical product approval.⁵¹

PROs are crucial in clinical trials for several reasons. First, some treatment effects are known only to the patient, and physiologic measures may not reflect how a patient functions or feels. Second, the FDA may require that a molecule demonstrates improvement in symptoms. If this is the case, biomarkers may not be sufficient as they measure objective changes rather than patient-perceived symptom reduction. Further, PROs can demonstrate treatment benefit, appear in FDA labeling, and/or can be used in publication and dissemination. The FDA looks favorably upon PROs that demonstrate good content validity and psychometric qualities and that have been developed in accordance with the FDA Guidance for Industry.⁵¹

1.4.1 PRO MEASURES USED IN CLE PATIENTS

At present, there are only a few PRO instruments used in patients with CLE. They are the Body Image Quality of Life Inventory (BIQLI),^{48,52} Dermatology Life Quality Index (DLQI),⁵³ Skindex,^{21,26,29} SF-36,⁵⁴ and Visual Analog Scale (VAS).⁵⁵ With the exception of the VAS, all of the PROs were used to assess the quality of life (QoL) in CLE patients.

1.5 PROBLEM STATEMENT

Dermatological diseases have been long recognized for their detrimental effect on the quality of life and health status of patient.^{34,56-61} While their impact on the patients has been well recognized, it is only recently that PRO measures have been used as assessment tools in both the management of chronic skin disease and the evaluation of new treatments.⁶² Disease-specific measures have been developed to assess the impact of atopic eczema, urticarial, contact dermatitis, scleroderma, acne, vitiligo, and Hidradenitis suppurativa on QoL but none to assess the impact of CLE.^{56-58,62} While all of the PRO measures used in CLE patients are presumed applicable, they were not all developed with input from patients with CLE. Also, CLE patients were not included in the concept elicitation phase via the use of qualitative interviews to elicit patient burden or concepts relevant to CLE patients. Also, most of the studies in which these PRO measures were used in CLE patients did not report psychometric properties. Hence, such instruments may not fully capture the relevant disease burden of CLE patients. Therefore, more work is needed to test the validity of existing PRO measures in the CLE population to allow use in future drug development and outcomes evaluation. In the future, ground-breaking therapies are expected to be launched into the market, resulting in an increase in the choice of treatment for patients with CLE. In order to make optimal therapeutic decisions on these new therapies, a better understanding of the impact of the disease burden among individuals with CLE is required.

1.6 STUDY RELEVANCE

CLE has clear effects on biological/physiological indicators, symptom status, functional status, general health perceptions, and overall QoL.²⁰ No curative therapy currently exists for CLE, making chronic disease management the operating clinical paradigm. Many CLE symptoms and related functional impairments are difficult or impossible to measure through laboratory or physician assessments. Due to the heterogeneous nature of CLE as well as the health issues experienced, the health perceptions of patients can differ significantly from those of clinicians. It is, therefore, important to use subjective measures, such as PROs to be able to capture QoL in patients with CLE. One of the goals of Healthy People 2020 is to help individuals of all ages increase life expectancy and improve their QoL; the challenge is to be aware of what factors affect a person's QoL. Thus, there is a significant gap in the literature as current QoL measures may not capture all issues relevant to CLE, since CLE patients were not well represented in the development of these instruments.⁵³

CHAPTER TWO: LITERATURE REVIEW

A review of the literature relevant to this study is presented. The major topics addressed are overview of CLE, conceptualization and measurement of quality of life (QoL), concepts of QoL applied to healthcare, attributes of QoL, approaches to measuring QoL, patient perspectives and QoL, and PRO measures used in CLE patients.

2.1 OVERVIEW OF CLE

Based on clinical morphology and average lesional life span, lupus erythematosus-specific skin lesions are divided into three broad categories.¹⁷ These include acute cutaneous lupus erythematosus (ACLE), subacute cutaneous lupus erythematosus (SCLE), and chronic cutaneous lupus erythematosus (CCLE). CCLE is the largest subtype of CLE and can occur as an isolated skin disease or in conjunction with SLE. Discoid Lupus Erythematosus (DLE) is the most common subtype of CCLE and can occur in a generalized form with lesions above and below the neck, or in a localized form, typically appearing as lesions above the neck in sun-exposed areas. Common symptoms include lesions that are red, patchy, crusty, scaling plaques, and these lesions are sometimes characterized by erythema, scarring, and dyspigmentation. While the lesions may appear anywhere on the body, they usually erupt like a “coin-like” or disc appearance on the ears, face, scalp, back, neck or any part of the body exposed to sunlight.⁶³ Patients may experience disfigurement and symptoms that can be exacerbated with increased exposure to sunlight.⁶⁴

2.1.1 EPIDEMIOLOGY OF CLE

Unbiased epidemiologic data on CLE are difficult to find as most studies are performed either by rheumatologists or dermatologists. This is because CLE patients, who do not present with SLE, are underreported by rheumatologists or over-reported by dermatologists.⁶⁵ The prevalence has been estimated to be between 17 and 48 per 100,000. CLE occurs at all ages and among all ethnic groups; it occurs more frequently in African Americans than in whites or Asians. DLE, in particular, is responsible for 50-85 percent of cases of CLE and occurs 2-3 times more frequently in women than in men. While CLE may occur at any age, it is more common in persons aged between 20 and 40 years.^{15,66}

2.1.2 ETIOLOGY OF CLE

Several studies have reported that smoking may lead to the development of CLE, and UV radiation may worsen CLE lesions.⁶⁷⁻⁶⁹ Another phenomenon known as the Koebner phenomenon that arises from non-specific injury to the skin as a result of trauma has also been attributed to the development of CLE.⁷⁰ The inflammatory process associated with CLE is thought to result from complex autoimmune mechanisms. Although associations with some complex histological antigens have been reported, other genetic or environmental factors that increase risk of CLE are unknown.⁷⁰

2.1.3 RISK FACTORS OF CLE

Strong risk factors associated with CLE are UV light exposure, smoking and being aged between 20 and 40 years. Other risk factors are female gender and non-specific skin injury.⁶⁷⁻⁶⁹

2.1.4 PATHOPHYSIOLOGY OF CLE

The accurate pathophysiology of CLE is not yet fully understood. However, it is suggested that the process is an immune-mediated one due to the detection of immune complexes, IgG and C3, along the epidermal basal membrane.⁷¹

2.1.5 SYMPTOMS OF CLE

Fatigue, pain, skin manifestations such as rash and photosensitivity, and hair loss (alopecia) are symptoms commonly reported in patients with CLE.^{17,55,72,73} Decreased energy and vitality resulting in the inability to engage in recreational or desired household activities have also been reported by CLE patients.⁷⁴

2.1.6 DIAGNOSIS AND PROGNOSIS OF CLE

CLE is primarily diagnosed clinically. Referral to a specialist dermatologist is warranted as diagnoses by non-specialists could be a difficult process. CLE lesions should be recognized and treated early; scarring, alopecia, changes in skin pigmentation may increase if it is not clinically managed early.²³ CLE can have a significant impact on quality of life of patients due to its prolonged course, and chronic refractory lesions

can often lead to psychological and social distress. In some cases, CLE may resolve spontaneously, but, if left untreated can lead to progressive lesions that spread to produce larger areas of scarring. Due to UV light exposure particularly in the spring and summer, acute exacerbations may occur.⁶⁹

2.1.7 TREATMENT OF CLE

CLE treatment is based on inflammatory activity and the extent of skin lesions. The primary goals of treatment are to improve physical appearance, reduce scarring and control existing lesions, and prevent the development of new lesions.⁷⁵ In addition to strict photoprotection, treatment can either be in the form of pharmacologic agents, supportive measures, or surgical care.⁷⁵⁻⁷⁷

Pharmacologic agents in the form of topical glucocorticoids are considered as first-line therapy for CLE.⁷⁸ Other agents like topical calcineurin inhibitors have also been shown to be effective in CLE treatment.^{79,80} Patients with widespread skin lesions or high inflammatory disease or those who have not been responsive to topical therapy are managed systemically with antimalarial agents like hydroxychloroquine, quinacrine, and chloroquine.^{81,82} Patients who have failed on topical agents or antimalarial therapy could be treated with methotrexate, retinoids, or the antibacterial agent, dapsone.⁸²⁻⁸⁴ Retinoids and thalidomide have limited use in patients of childbearing age due to their teratogenicity.⁸⁵ Supportive measures include limiting sun exposure, wearing protective clothing or using high factor sunscreens. Cosmetic camouflage may also be used for

lesions that are in visible places. Burned-out scarred lesions may be excised surgically and in some cases, laser therapy can be considered.^{75,77}

2.1.8 ECONOMIC AND HUMANISTIC BURDEN OF CLE

While there is no data on the economic burden of CLE, a study published in 2013 reported that patients with SLE had an average annual direct cost ranging from \$2,214 to \$16,875 and an average annual productivity loss cost ranging from \$2,239 to \$35,540.⁸⁶ Due to the chronic nature of CLE, the comorbidities (especially psychiatric disorders like anxiety and depression)^{26,33,35} that occur as the disease progresses and the negative impact of CLE on patients' health-related QoL (HRQoL) and productivity, the burden associated with the management of CLE can be significant. HRQoL parameters affected by CLE include mental well-being and physical and social functioning. CLE patients also present with pain, fatigue, itching, alopecia, and photosensitivity.^{17,55,72,73}

2.2 CONCEPTUALIZATION AND MEASUREMENT OF QUALITY OF LIFE (QOL)

The term "quality of life" has been used for decades to describe the expectations of satisfaction, psychological fulfillment and well-being of people.^{87,88} QoL has different connotations to different people, and its definition is based on the area of application, in that economists might define it as material goods and social workers or policy makers might define it as social welfare.⁸⁹ QoL is a complex construct, and there are many inconsistencies in its definition.^{90,91} These inconsistencies and many

definitions of QoL across the literature have made it difficult to uniformly compare findings.

A study published in 1981⁹² found that less than 10 percent of 250 studies citing quality of life in the title gave a definition. Similarly, Gill and Feinstein,⁹³ assessing 75 randomly chosen articles that had described measuring 'quality of life,' found that 11 (15%) had given a conceptual definition of the term 'quality of life' or had described the contents of measures used. The resultant effect of this ambiguity is that it is often impossible to determine what exactly is being measured, and the rationale for including certain measures in certain studies is often unclear.⁹¹ Further, Ferrans⁹⁴ identified a broad set of definitions for QoL used in healthcare. Specifically, QoL was grouped into five broad categories: a normal life, achievement of personal goals, social utility, natural capacity, and happiness/satisfaction. Ferrans further argues that when selecting a QoL instrument for use in clinical research and practice, considerations should be given to those that reflect: the definition of QoL selected, the perception of the individual whose QoL is being measured, the multidimensional nature of QoL rather than focusing on health concerns, and the differences in individual values.⁹⁴ In many cases, the definition of QoL is ascertained from how the researcher uses and measures it.⁹⁴

According to the World Health Organization (WHO), QoL can be defined as individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns. Specifically, QoL was defined as a broad ranging concept affected in a complex way by the person's physical health, psychological state, the level of

independence, social relationships, personal beliefs and their relationship to salient features of their environment.⁹⁵ Fitzpatrick, Davey, Buxton & Jones⁹⁶ conducted a systematic review where they documented the definitions of health and QoL, and its evolution in decades. These findings are replicated in Figure 2.1.

Since the 1970s, QoL has had a growing importance in the field of health care. Draper and Thomson⁸⁸ conducted a literature search on “Medline” using the phrase “quality of life” where they reported finding only two papers published between 1966 to 1970, 114 studies in 1971 to 1975, 938 papers in 1976 to 1980 and up to 11,000 papers in 1996 to 1999. This rapid increase in QoL publications has been attributed to advances in medical practice as well as increases in the evaluation of the quality of the prolonged lives in patients with chronic diseases.⁹⁷ Given that there are many patients with chronic, manageable diseases, assessing their QoL has become a standard component in evaluating their health outcomes as well as in assessing the morbidity of diseases.⁹⁸

Illustrations of range of definitions and discussions of health and QoL by Fitzpatrick, Davey, Buxton & Jones
<ul style="list-style-type: none"> • Health as a ‘state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.’⁹⁹ • ‘Quality of life is an individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns.’¹⁰⁰ • ‘Quality of life refers to patients’ appraisal of and satisfaction with their current level of functioning as compared to what they perceive to be ideal.’¹⁰¹ • ‘Health-related quality of life is the value assigned to duration of life as modified by the impairment, functional states, perceptions and social opportunities that are influenced by disease, injury, treatment or policy.’¹⁰² • ‘Health-related quality of life refers to the level of well-being and satisfaction associated with an individual’s life and how this is affected by disease, accidents, and treatments from the patient’s point of view.’¹⁰³ • ‘Quality of life is enhanced when the distance between the individual’s attained and desired goals is less.’¹⁰⁴ • ‘Quality of life measures the difference, or the gap, at a particular period of time, between the hopes and expectations of the individual and that individual’s experiences.’¹⁰⁵

Figure 2.1: Illustrations of range of definitions and discussions of health and QoL

2.3 CONCEPTS OF QOL APPLIED TO HEALTHCARE

Several concept analyses have been conducted by health scholars to capture the definition and attributes of QoL.^{97,105-109} Using the concept analysis framework of Walker and Avant,¹¹⁰ several experts reviewed the concept of QoL and its critical attributes.^{97,105-109} Below is a summary of their findings.

2.4 ATTRIBUTES OF QOL

For the most part, there is a consensus among these experts regarding the attributes of QoL. First, QoL is subjective and captures the perception of an individual,^{97,109,111,112} sense of satisfaction,^{108,112} and well-being.^{97,112} Second, objective indicators that may serve as proxies for examining QoL in those who are unable to communicate, only play a supplementary role in the assessment.^{97,109,113,114} However, results from these objective findings are not comparable with those obtained from self-assessments. Third, QoL is dynamic in nature.^{97,113} Fourth, QoL is a multidimensional concept that contains social, physical, and psychological dimensions.¹¹¹⁻¹¹³ Last, QoL is culture-specific and based on an individual's perception.¹¹³ To add more validity to these core attributes identified, more literature reviews were done to provide a deeper understanding of each attribute and their relationship to QoL. Expanded illustrations of the five QoL attributes are provided below:

2.4.1 FIRST ATTRIBUTE: QOL IS *SUBJECTIVE* AND CAPTURES THE PERCEPTION OF AN INDIVIDUAL

Researchers measuring QoL emphasize that QoL is a “state of mind, not a state of health.”¹¹⁵ Feinstein¹¹⁵ further pointed out that an individual's QoL is based on that individual's interpretation rather than observable variables or comparison with other persons. More specifically, QoL can also be considered to be “the degree to which a person enjoys the important possibilities of his or her life.”¹¹⁶ These definitions are based on the valuation placed on life experience by the individual without any reference

to a comparison group.¹¹⁷ Haas⁹⁷ based this contradiction on the notion that objective assessments are based on imposed observable standards while those of subjective measures are based on the perceptions of an individual. It should also be noted that because responses given to subjective measures are ‘subjective,’ they can be susceptible to situational influences, such as social desirability, response bias, poor recall, self-consciousness, or acquiescence factors related to expected behavior.^{118,119}

2.4.2 SECOND ATTRIBUTE: OBJECTIVE INDICATORS AND SUPPLEMENTARY ASSESSMENT

Objective indicators have been shown to be used as a proxy in examining QoL in individuals who are unable to provide subjective feedback, such as comatose or mentally incompetent patients. In such cases, objective indicators like lab values (if appropriate) might be used instead. However, if the individual being assessed is mentally competent enough to provide subjective feedback, the results from both objective and subjective assessments may not be comparable.⁹⁷ Results from these objective findings are not comparable with those obtained from self-assessments. For example, when assessing the impact of vomiting on the QoL of a person, an objective assessment of this would only count the number of times of vomiting, whereas a subjective assessment, which is based on individual perceptions, would consider the cause and meaning behind the vomiting, such as the triggers behind the vomiting. In this case, it is thus apparent that the subjective and objective assessments would be different. The context of personal situations is not included in the objective assessments.

Additionally, findings from the literature report discrepancies in proxy QoL assessment when completed by significant others of patients and health care givers.^{120,121} Sneeuw et al.¹²⁰ compared QoL ratings of patients by 100 patients with 93 significant others and their health care providers, including 97 doctors and 99 nurses. Patients, significant others, doctors and nurses were asked to complete the Dartmouth Coop Functional Health Assessment/World Organization of National Colleges, Academies and Academic Association of General Practitioners (COOP/WONCA) charts independently of each other. The COOP/WONCA assesses QoL by using a core set of domains, including physical fitness, feelings, daily and social activities, overall health and pain. Scores range from 1 to 5, with 1 representing the best and 5 indicating the worst level of functioning or well-being. While no statistically significant differences were observed between patients' and nurses' ratings, the physicians' ratings indicated less pain than those reported by the patients but indicated more impaired feelings. Further, significant others rated patients as having more pain, more impaired levels of feelings and daily activities, and poorer overall health and QoL than the patients themselves did. In addition to the discrepancies observed in ratings, the authors also reported differences in the perceived importance of various QoL domains.

Rothwell, McDowell, Wong, and Dorman¹²² compared the judgments of clinicians on which domains of health in the Short Form 36 (SF-36) would be most important to patients themselves. A statistically significant difference was observed in the choices selected between the 42 patients with multiple sclerosis and their 25 physicians. The physicians were significantly more likely to give higher ratings to

physical role limitations and physical functioning than they were with mental health and emotional role limitations. The results suggest that while patients were more concerned about their mental health, doctors focused on the domains related to physical abilities.

2.4.3 THIRD ATTRIBUTE: QOL IS DYNAMIC IN NATURE

QoL has been described by several researchers as being dynamic in nature.¹²³⁻¹²⁶ Due to ever-changing life events, the progression of illness, and personal developments, individuals may rate their QoL differently over time,¹²⁵ which may change their perception of which domains of QoL are important.¹²⁶ When people face a life-threatening or chronic illness, they tend to adjust their internal standards and values to accommodate the adverse circumstances.^{124,127} As a result, it is important for the content of QoL measures to be reappraised whenever a significant life change occurs in such patients.

2.4.4 FOURTH ATTRIBUTE: QOL IS A MULTIDIMENSIONAL CONCEPT

Skevington¹²⁸ stated that “QoL is about the meaning people derive from the important aspects of their life,” therefore, it is unlikely that a single parameter of human experience will capture the QoL of an individual.¹²⁹ QoL has been widely described as multidimensional with dimensions ranging from physical, psychological to social.^{113,130} These three broad dimensions align with the components of health delineated by the World Health Organization (WHO):⁹⁹ “health is a state of complete physical, mental,

and social well-being and not merely the absence of disease...” A model was developed by Spilker² to illustrate the different dimensions of QoL [See Figure 2.2 below].

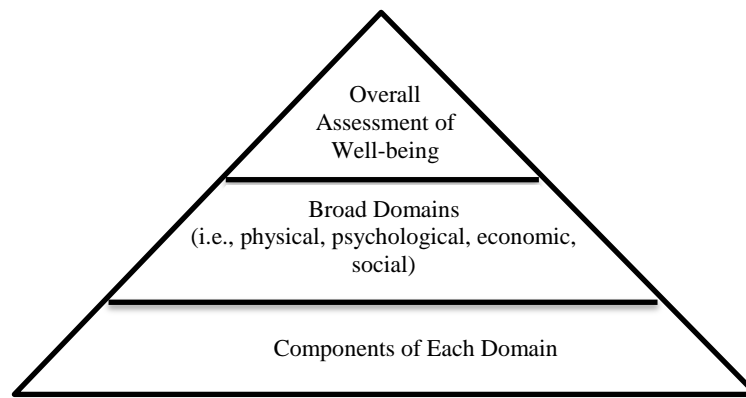


Figure 2.2: Three levels of quality of life²

According to Spilker,² the pyramid has three levels. The topmost level is the overall assessment of well-being and the perception of overall QoL while the middle level contains the essential multidimensional domains of health, that is, physical, psychological, and social dimensions. The lowest level consists of the micro-components constituting each QoL dimension. These smaller components are observable and measurable and are important factors in persons whose QoL are being measured. To ensure that the measures of QoL are practicable enough, domains included should accurately and sufficiently reflect the QoL of the population under study.

2.4.5 FIFTH ATTRIBUTE: QOL IS CULTURE-SPECIFIC AND BASED ON AN INDIVIDUAL'S PERCEPTION

Individuals often evaluate their life circumstances in the context of their culture and values, especially when making appraisals regarding their QoL.⁹⁷ Thus, assessments of QoL in patients from different cultures will produce different results.¹³¹ Chen, Miaskowski, Dodd, and Pantilat¹³² provided a deeper context to the sociocultural dimension of the cancer pain experienced by Chinese patients. The authors reported that Chinese cancer patients view pain as a complex experience that can only be understood through an understanding of several Eastern philosophies and religions of Taoism, Buddhism, and Confucianism. Also, Chinese patients view the body as a whole energy field that ought to be in harmonious balance with its environment. These cultural influences and beliefs may lead to differences in pain management and perception, which may impact a patient's QoL.

2.5 APPROACHES TO MEASURING QOL

There are two main philosophical approaches to measuring QoL: the health status approach, and the well-being approach. These two approaches have different implications in assessment, with one approach involving objective and observable outcomes, and the other entailing the perception and valuation by the individual.

The health status approach focuses mostly on observable or behavioral outcomes. Kaplan and Anderson¹³³ state that quality of life is “the impact of health conditions on function.” Indeed, the impact of illness on daily functioning and capacity

has been captured by several QoL instruments. A classic example is the Sickness Impact Profile, which measures the behavioral impact of illness and diseases. The emotional subscale questions that measure emotions, feelings and sensations ask about laughing, crying or acting irritably, rather than internal states.¹³⁴ Moreover, QoL measures are often validated by examining their associations with “objective” measures of diseases, such as disease severity indicators or physician ratings.¹³⁵ Objective QoL measures are therefore used to reflect more closely clinical indicators than subjective assessments given that they are readily measured and observable. Further, the use of an objective approach ensures clear definitions of concepts that are easily measured and thus result in high interrater reliability. Also, objective measures allow for comparison across individuals, and to know where an individual stands relative to other groups or individuals. Nonetheless, objective measures have been reported to be poor predictors of well-being and satisfaction of patients, since they often do not take into consideration the perceptions of the patients.^{136,137}

The well-being approach focuses on an individual’s perception of their QoL rather than observable measures or comparisons with groups or other persons. The proponents of this approach purport that QoL is a “state of mind, not a state of health.”¹¹⁵ Above and beyond simple physical processes or variables, subjective assessment considers the experience and valuations of the patients. For example, Brown, Renwick and Nagler¹¹⁷ stated that QoL is whatever people think comprise quality in their life. QoL has also been considered to be “the degree to which a person enjoys the important possibilities of his or her life.”¹³⁸ These two definitions reflect the

emphasis being placed on the individual's valuation of their life experience. Hunt⁹¹ even suggested that an individual's QoL is made up of several complex interactions and idiosyncratic personal values that the notion of a traditional measurement of it is inappropriate. Also, since subjective measures represent the culmination of complex, internal processes that may differ across respondents unlike objective measures, findings from subjective measures are not readily comparable across individuals. Despite these arguments, subjective experiences have continued to be captured through measurement by researchers. Indeed, there are many merits to using the subjective approach to capture QoL. For example, subjective measures operationalize the internal judgement of the participants rather than what the researcher deems important; in many cases, the individual's perception is indeed the outcome of interest.¹⁰⁸ Subjective measures have also been reported to be more strongly associated to the outcomes of interest and are better suited for the study of broadly-defined concepts than their "objective" counterparts.¹³⁹ Also, subjective measures of QoL have been reported to have good reliability, be fairly sensitive to changes, to have adequate validity, and converge well with other measures of well-being.¹⁴⁰

The subjective approach to assessing QoL has the potential to provide detailed and useful information about the experiences of people with chronic clinical conditions.¹⁴¹ Researchers utilizing this approach focus more on understanding the everyday experience as it is lived by the respondents; such researchers do not seek to validate their own theories.

2.6 PATIENT PERSPECTIVES AND QOL

The term “quality” could imply subjective assessment, and as such, QoL measures should incorporate the patients’ perspectives. Moreover, if the goal of QoL assessments is to assess an individual’s perception of how good or poor their life experience is, then simple health ratings will not suffice to capture appropriately these measures. For example, clinicians and standardized instruments used in chronic diseases focus mostly on physical symptoms rather than capturing the full range of psychosocial issues.¹⁴² The use of patient-centered outcome instruments will give respondents the opportunity to report on their area of lives that matter.^{143,144} Given the increasing interest in individualized care in patients with chronic diseases, exploring the patients’ perspectives by asking meaningful questions is the first step to developing valid QoL measures. These measures that are used to gain insight from patients’ perspectives into which aspects of their health matter and on how diseases and treatment impact their QoL are called Patient-Reported Outcome (PRO) measures.⁵¹ Data generated from PRO measures are used as adjuncts in clinical-making decisions when monitoring outcomes from clinical interventions. Further, the use of PROs is important in improving communication between physicians and patients.⁵¹

Common concepts measured by PROs include health status, quality of life (QoL), health-related quality of life (HRQoL), symptoms and functioning, well-being and treatment satisfaction.⁵¹ Other important considerations for use of any PRO measure include: (1) whether the measure is disease-specific or generic; (2) which life

domains (e.g., psychological well-being, social functioning) are being studied and which are not; and, (3) population and setting for which the measure is intended.⁵¹

2.6.1 GENERIC OR DISEASE-SPECIFIC PRO MEASURES

PRO measures can either be generic or disease-specific. Generic instruments are designed to assess life domains across a broad range of populations. They can also be used in different settings, health interventions, and medical treatments.¹⁴⁵ Generic instruments may be in the form of health profiles, single indices, or utility measures.

Health profiles are single instruments that attempt to measure the relevant dimensions from a patient's perspective.^{145,146} The Short Form - 36 (SF-36) Health Survey⁵⁴ is an example of a health profile designed to assess general health and evaluates the following domains over the past four weeks: physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional (RE) and mental health (MH). Health profile instruments differ in length, in the time needed to complete the surveys, and on domains measured.¹⁴⁷ In addition, scales from health profile measures may either yield one score, called an index, or they may have questions for each category, yielding separate scores.¹⁴⁸ Health profile instruments were not developed for specific diseases but rather with input from participants in the general population. As a result, they allow for broad comparisons of the relative impact of various health care programs, treatments and interventions.^{145,146} They also may provide insights to constructing disease-specific instruments aimed to target areas of much-needed impact on

HRQoL.¹⁴⁹ However, health profile instruments are too general for certain interventions and may not be responsive to clinical changes over time.^{62,63}

Single indices reduce several concepts to a unidimensional scale. For example, the Karnofsky Performance Status score,¹⁵⁰ commonly used in cancer trials, allows patients to be classified as to their functional impairment. Single indices are brief and easy to administer but are less reliable and valid and yield limited information compared to multi-domain scales.¹⁵¹

Utility measures are derived from economic principles based on decision analysis and prioritization of choice.¹⁵² The term utility refers to the preferential value placed on a certain particular health state. Domain scores range from 0 to 1, with a score of 0 indicating death and a score of 1 indicating a perfect state.¹⁵³ One of the most well-studied examples and a generic measure of health outcomes is the EQ-5D. It consists of 6 items that cover five main domains (mobility, self-care, usual activities, pain/comfort, anxiety/depression) and a general visual-analog scale (VAS) for health status. A preference-based set of weights (or algorithm) is used to calculate a single index-based utility score of QoL from each profile score.^{154,155} Utility measures are amenable to economic analyses, particularly to cost-utility analyses.¹⁴⁹ For example, findings from a cost-utility analysis may be used as justification to allocate resources to treatment. However, utility measures do not provide details as to the aspects of patients' lives that are affected.¹⁴⁹ Similar to health profiles, utility measures may not be sensitive to small but clinically important differences.¹⁴⁹

Specific instruments measure the specific areas of primary interest (i.e., population, problem, domain or function).^{145,146} This approach improves responsiveness since only specific aspects are measured.¹⁴⁵ For example, disease-specific measures are used to capture domains of QoL of relevance to a specific patient disease group. Disease-specific measures are also more likely to be of clinical relevance and are more likely to be responsive in detecting minimal clinically important differences.⁵¹

An example is the Myotonic Dystrophy Health Index (MDHI),¹⁵⁶ which measures overall disease burden and impact of key symptomatic themes in patients with myotonic dystrophy type-1 (DM1). The MDHI scale consists of 114 items, with 17 subscales that measure the most important symptomatic DM1 themes. The weighted sum of responses is transformed to a 0–100 scale by expressing it as a percentage of the maximum possible value, with a score of 100 representing the most severe disease burden and a score of zero representing no disease impact.¹⁴⁵ The drawback to using specific instruments such as the MDHI is that they are not comprehensive enough and cannot be used to compare across diseases states or even populations.¹⁴⁹ Another example is the Vitiligo-specific health-related quality of life (VitiQoL), which was recently developed and validated in use for patients with vitiligo.^{157,158}

Since there is no one group of instruments that will achieve all the potential attributes of an ideal PRO measure, multiple instruments may be used. For example, health profiles and disease-specific measures may be used together so as to increase the representativeness of whatever domain is under investigation.¹⁴⁹

Finally, regardless of whether a PRO measure is generic or disease-specific, it must demonstrate satisfactory psychometric properties including item response theory analyses, reliability, responsiveness to changes (sensitivity), and validity in the measured domain.¹⁵⁹

2.7 PRO MEASURES USED IN CLE PATIENTS¹

At present, there are a small number of PRO instruments used in patients with CLE. This section will focus specifically on the PRO instruments used to capture disease burden in CLE patients that were identified through a systematic review.

Findings from the systematic review identified the PROs used in CLE patients were: Body Image Quality of Life Inventory (BIQLI),^{48,52} Dermatology Life Quality Index (DLQI),⁵³ Skindex,²⁹ SF-36,⁵⁴ and Visual Analog Scale (VAS).⁵⁵ With the exception of the VAS, all of the PROs were specifically used to assess QoL in CLE patients. Table 2.1 summarizes study findings from PROs used in CLE patients.

¹ **Ogunsanya ME**, Kalb SJ, Kabaria A, Chen S. A systematic review of patient-reported outcomes in patients with cutaneous lupus erythematosus. *Br J Dermatol.* 2017;176(1):52-61.

Ogunsanya ME conducted the literature review and drafted the manuscript.

Table 2.1: Summary of PROs used in CLE patients						
Citation	Patient Population (Age and Gender composition)	Sample Size	CLASI Score Reported	Main objective	Type of PROs Used	Key Findings
Verma et al. ³⁰ (2014)	Mean±SD (35.2±16.9 years), range (10-82 years) Female (78%)	251	Yes, CLASI damage median scores = 7.33, range (4 – 10)	To evaluate the impact of lupus-related skin damage on skin-specific QoL and to analyze differences stratified by ethnic background.	Skindex-29	There was no significant correlation between CLASI damage scores and Skindex domains overall. African American patients exhibited a high rate of DLE and experienced damage early in their disease course, frequently in conjunction with disease activity.
Ishiguro et al. ⁷³ (2014)	Mean±SD (48.4 ±13.3 years), range (25–75 years) Female (85.2%)	54	Yes, CLASI activity and damage scores	To assess whether the skin symptoms in CLE are associated with the QOL using the Japanese versions of the Skindex-29 and CLASI	Skindex-29	Female gender in “Functioning” and “emotions” and older age in “symptoms” before treatment were significant risk factors for poor QoL. Also, the presence of inflammatory alopecia and photosensitivity were also predictors of poor QoL.
Méndez-Flores et al. ⁵⁵ (2013)	Mean±SD (34.2±11.2 years) Female (90%)	42	Yes CLASI activity median score = 17, range (8-48)	To evaluate the association of pain and pruritus with Dermatologic Quality of Life (QoL) and cutaneous disease activity in patients with 1) specific cutaneous lupus erythematosus (CLE) lesions, 2) non-specific CLE lesions and 3) both types of CLE lesions.	Dermatology Life Quality Index (DLQI), Pain and pruritus VAS	Pain was identified pain as a factor that correlated with dermatologic QoL and cutaneous activity.

Table 2.1: Summary of PROs used in CLE patients (Cont'd)						
Citation	Patient Population (Age and Gender composition)	Sample Size	CLASI Score Reported	Main objective	Type of PROs Used	Key Findings
Chang et al. ¹⁶⁰ (2013)	Mean±SD (64.3±13.6 years), range (18 – 93 years). Median age was 67 years	39	No	To assess whether patients who demonstrated response to treatment also experienced change to their quality of life.	Skindex-29	Response in disease activity was accompanied by an improvement in skin-specific quality of life measures. Correlation analysis suggests that disease activity is not the only factor influencing quality of life.
Vasquez et al. ²¹ (2012)	Mean±SD (46±13.5 years) Female (85%)	248	No	To compare quality of life indicators between patients with CLE at the University of Texas Southwestern (UTSW) Medical Center and those at UPenn.	Modified Skindex-29+3 SF-36	Most quality of life indicators were similar between the two CLE populations. Differences in psychosocial behavior, and a larger proportion of patients with SLE and females in the UTSW group likely attributed to differences in a minority of Skindex-29+3 and SF-36 subdomains.
Martins et al. ¹⁶¹ (2012)	Mean (46 years)	26	No	To compare the QoL of patients with DLE and SLE with skin injuries.	Dermatology Life Quality Index (DLQI)	Patients with DLE have a worse quality of life than patients with SLE. It is believed that this fact is generated by the difference in the spectrum of injuries.
Foering et al. ²² (2012)	≥18 years Female (80%)	169	Mean ± SD CLASI score (7.93±8.93)	To determine the prevalence of photosensitivity among CLE population and to examine its impact on QoL.	Modified Skindex-29+3	Self-reported photosensitivity is very common among cutaneous lupus patients and is associated with significant impairments related to symptoms, emotions, and daily functioning.

Table 2.1: Summary of PROs used in CLE patients (Cont'd)						
Citation	Patient Population (Age and Gender composition)	Sample Size	CLASI Score Reported	Main objective	Type of PROs Used	Key Findings
Klein et al. ²⁶ (2011)	Mean (47 years) Female (83%)	75	No	To determine how CLE affects QoL and which independent variables are associated with poor QoL.	Modified Skindex-29+3 SF-36	CLE patients have very impaired quality of life, particularly from an emotional perspective.
Klein et al. ⁴⁹ (2011)	≥18 years Female (89%)	157	Mean CLASI activity score (14.5)	To determine how to use the CLASI to classify patients according to disease severity (mild, moderate, and severe) and to identify which patients respond to therapy.	Skindex-29	The CLASI can be used to categorize patients into severity groups and to identify clinically significant improvements in disease activity.
Gaines et al. ²⁰ (2008)	-	8	No	To assess the relationship between the change in CLE disease severity and quality of life.	Skindex-29	Skindex-29 (QoL) scores did not easily correlate with improvement or deterioration of the disease. QoL does not uniformly improve as the activity of the disease wanes. This may mean that attention to cosmetic outcomes may need to become a routine part of our treatment plans for CLE patients.
Ferraz et al. ⁷⁴ (2006)	Mean±SD (38±12), range (20 – 78) Female (83%)	71	No	To translate the DLQI into Brazilian–Portuguese, to culturally adapt it, and to evaluate its reliability and validity in the assessment of Brazilian patients with CLE.	Dermatology Life Quality Index (DLQI)	The results suggest that the Brazilian–Portuguese version of the DLQI is a reliable and valid outcome measure to be used in CLE clinical studies.

Table 2.1 reports some key data on study design and findings. Overall, 1,272 CLE patients were enrolled in the articles reviewed. Out of eleven studies, four were conducted outside of the US,^{55,73,74,161} while seven studies were conducted in and recruited patients from the US.^{20-22,26,30,49,160} Symptoms and HRQoL were evaluated using generic HRQoL instruments or instruments developed for skin diseases (either alone or in conjunction with other instruments). The most frequently used was the Skindex, applied in eight (66.7%) studies,^{20-22,26,30,49,73,160} followed by the DLQI in three (25%) studies.^{53,74,161} However, neither of these PRO measures was devised ad hoc to measure HRQoL in CLE patients specifically. This means that while all of the PRO measures used in CLE patients are applicable, they were not all developed with input from patients with CLE. Also, CLE patients were not included in the concept elicitation phase via the use of qualitative interviews to elicit patient burden or concepts relevant to CLE patients. Most studies used only one PRO instrument; three studies used two instruments.^{21,26,55}

2.7.1 BODY IMAGE QUALITY OF LIFE INVENTORY (BIQLI)

The Body Image Quality of Life Inventory (BIQLI) was designed to explore and quantify how a person's body image experiences affect several life domains such as social functioning, sexuality, sense of self and emotional well-being. The BIQLI does not measure body image per se; rather, it assesses the impact of one's body image experiences on various psychosocial domains of life.¹⁶² Body image is based on Erickson's theory of psychosocial development during the adolescent years because it is a period of self-searching. Erikson¹⁶³ postulates that the bid to gain confidence and search for themselves further drives adolescents away from their parents. The BIQLI is a 19-item scale with acceptable reliability and validity, and it is commonly used in studies assessing body image.^{52,162,164,165} It has a recall/observation period of four weeks and is scored on a 7-point scale ranging from very negative (-3) to very positive (+3). A composite score is calculated, with a higher score indicating better body image and a higher quality of life (QoL).⁵² With regards to assessing QoL in patients with CLE, the BIQLI has been used only in one study.⁴⁸ Jolly, Kazmi, Mikolaitis, Sequeira, & Block⁴⁸ sought to validate the CLASI against patient-reported assessment of quality of life and body image (using the BIQLI). Findings from this study report that the presence of CLASI activity on visible body areas was significantly associated with worsened body image and QoL concerns. The mean (SD) BIQLI score was 0.46 (1.5), indicating that participants had negative body image. No reliability or validity statistics were reported for the BIQLI scale in this study, although other studies have shown that the reliability of the BIQLI is high (0.67 – 0.94).^{164,165}

2.7.2 DERMATOLOGY LIFE QUALITY INDEX (DLQI)

The Dermatology Life Quality Index (DLQI) was designed to measure the QoL of dermatology patients and as an outcome measure in health services research.⁵³ It was designed specifically for skin and connective tissue diseases. It is self-administered and measures health-related quality of life, including health status. The recall/observation period is the last week and it contains 10 questions. Questions from the DLQI can be further divided into six different domains: daily activities, leisure, work and school, symptoms and feelings regarding the disease, and interpersonal relationship and treatment. Each domain has a score ranging from 0 (no interference) to 3 (a lot of interference). Three studies have used the DLQI to assess QoL in CLE patients.^{55,74,161} A total of 139 CLE patients were recruited in these studies, with an age range of 20 – 76 years and with women making up to 90 percent (N=73) of the population sampled. Only one study reported a CLASI activity score with a median score of 17 (range = 8 – 48),⁷⁴ indicating moderate activity.⁴⁹ Overall, respondents reported high DLQI score, indicating that having CLE interfered a lot with their QoL. One study reported that DLQI was able to capture the worsening impact on the quality of life in patients with alopecia (also a clinically important difference), thus demonstrating discriminant validity.⁷⁴ This same study reported an inter-observer reliability coefficient of 0.96 ($p<0.001$).⁷⁴ None of the other studies reported reliability or validity estimates.

2.7.3 SKINDEX

The Skindex²⁹ is a disease-specific instrument developed to measure the effects of skin and connective diseases on quality of life in patients. The instrument is available in three different forms, depending on the number of items. The Skindex 16, 29 and 61 have 16, 29, and 61 items, respectively. The recall/observation period for each form of the Skindex scale differs from one another. The Skindex-16 has a recall/observation period of one week, and the Skindex 29 and 61 have a recall/observation period of four weeks. The Skindex-29 is the most commonly used form in CLE studies, and it focuses on three domains: symptoms (seven items), emotions (10 items), and functioning (12 items). The symptoms scale measures the physical burden of the disease, such as pain, itch, burning, or sensitivity. The emotions scale measures the psychological effects of the disease, such as depression, anxiety, embarrassment, or anger. The functioning subscale focuses on the changes to daily life, such as work, sleep, and relationships with others.¹⁶⁶ The Skindex-29 is measured on a five-point Likert-type scale, and the overall score, as well as the individualized scores for each dimension, are converted to a scale of zero (no impact on QoL) to 100 (maximum impact on QoL).

A total of seven studies used the Skindex-29 scale to measure QoL in CLE patients.^{20-22,26,30,49,73} Two of these seven studies added three questions to the Skindex-29 scale to assess lupus-specific concerns (such as photosensitivity and alopecia).^{21,26} A total of 962 patients were recruited in these studies, with an age range of 10–82 years and with women making up to 84 percent (N=770) of the population sampled. Overall, participants reported high scores on “Emotions,” “Symptoms,” and “Functioning,”

suggesting that patients' QoL were somewhat severely impacted by CLE. None of the studies reported any psychometric properties for the scale.

2.7.4 THE SHORT FORM-36 (SF-36)

The Short Form-36 (SF-36) is a 36-item measure designed to assess general health and evaluates the following domains over the past four weeks: physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional (RE) and mental health (MH).^{54,167} Domain scores range from 0 to 100, with higher scores reflecting better health. In addition, two overall summary scores can also be obtained – Physical Component Summary (PCS) and Mental Component Summary (MCS) scores. Summary scores are transformed to have a mean of 50 and standard deviation of 10, with greater scores indicating better health.

The SF-36 was not developed specifically with input from patients with CLE, but with participants from the general population. The SF-36 was used in two studies concurrently with the Skindex-29 to assess QoL in CLE patients.^{21,26} Findings from one of the studies reported that CLE patients scored significantly lower on both the physical [mean (SD) scores = 41 (13)], and the mental component scores [mean (SD) scores = 39 (12)] than patients with other skin diseases.²⁶ Further, the second study reported that CLE patients scored lower on the physical functioning, role-physical and general health subscales from the SF-36 than the general population.²¹

The psychometric properties of the SF-36 were not evaluated in these CLE patients, even though the instrument has demonstrated evidence of acceptable reliability (internal consistency), construct validity (convergent and known-groups) and ability to detect change (responsiveness and sensitivity to change) in other dermatological diseases as well as other disease states.¹⁶⁸⁻¹⁷⁷

2.7.5 VISUAL ANALOGUE SCALE (VAS)

A VAS is an instrument used to measure a characteristic or attitude that is believed to range across a continuum of values and cannot easily be directly measured.¹⁷⁸ The VAS was devised to capture this idea of an underlying continuum. Operationally, a VAS is usually a horizontal line, 100 mm in length, anchored by word descriptors at each end, as illustrated in Figure 2.3. The patient marks a point on the line that represents the perception of his/her current state. The VAS score is determined by measuring in millimeters from the left-hand end of the line to the point that the patient marks.

E.g., how severe is your itching today? Place a vertical mark on the line below to indicate how bad you feel your itching is today.

No itching | _____ | A lot of
itching

Figure 2.3: VAS assessing pruritus/itching in patients

The VAS has been used in CLE patients to measure pain and pruritus, two important domains in CLE. Mendez-Florez, Topete, Bermejo, and Molina⁵⁵ evaluated the association of pain and pruritus (as measured by VAS) with DLQI and cutaneous disease activity of patients with CLE. Their study findings reported that while pain and pruritus were important symptoms reported by CLE patients, only pain was positively and significantly correlated with DLQI and cutaneous disease activity.

2.8 SUMMARY

This chapter provided a comprehensive review of the literature that lends support to this study. CLE is a chronic, debilitating disease that significantly impacts the quality of life of patients. Also, while all of the PRO measures used in CLE patients are applicable, they were not all developed with input from CLE patients. CLE patients were not included in the concept elicitation phase via the use of qualitative interviews to elicit patient burden or concepts relevant to them. To this end, use of a CLE-specific PRO instrument will significantly improve the understanding of the health status of individuals from the patient's perspective and provide valuable information on future interventions for CLE patients.

Research on the QoL of CLE patients, including an understanding of which factors affect their QoL, may help inform clinicians and health policy makers regarding the burden of the disease as well as the interventions that might potentially be disease-modifying.

CHAPTER THREE: THEORY

This chapter outlines the theoretical framework guiding this study. Further, this chapter delineates the relationships between demographic/personal characteristics and QoL in CLE patients. The ultimate goal of modeling QoL and its domains in CLE patients using a theoretical framework is to identify empirical factors that impact these patients. Further, such findings can be used to tailor interventions specifically to CLE patients to improve their overall QoL.

Quality of life has become an increasingly important endpoint for clinically assessing patient outcomes, especially in those with ‘chronic’ diseases such as CLE. CLE has been reported to impair the QoL of patients.^{74,179} Therefore, to accurately estimate QoL in these patients, appropriate measures need to be selected to enhance the success of the application of the PRO measures. Finally, use of a theoretical framework will allow for the development, validation and eventual use of PRO measures have undergone a sound process.

3.1 THEORETICAL MODELS USED IN QOL

There are three different types of theoretical models used in describing QoL: conceptual models, conceptual framework, and theoretical frameworks. Of the three theoretical models, conceptual models are considered to be the least sophisticated. Conceptual models delineate domains and subdomains of the concept of QoL, such as physical, social, psychological, and functional.¹⁸⁰ However, these models lack the clarity on how the constructs that make up the models operate.¹⁸¹ Conceptual

frameworks, on the other hand, are organized in such a way that the nature and direction of the associations in the model are specified. A weakness of conceptual frameworks is that they are not based on time-tested theories that represent the findings of several investigations on how phenomena occur. Conversely, theoretical frameworks offer not only the nature and direction of associations but they also provide a structure of concepts represented in the hypothesized model.¹⁸² Also, theoretical frameworks include the added specifications of potential causality. The causal variables included in theoretical frameworks delineate the process that leads to the outcome variable.¹⁸³

Assessing QoL without a theoretical framework poses a lot of issues, such as: 1) failure to assess if or how domains are related to one another; 2) lack of interpretation of the meaning of patterns observed in relationships; and 3) inability to identify whether the variables are moderated or mediated by the disease, the person, or treatment-related factors.¹⁸⁴ The use of a theoretical framework also allows for placement of concepts in a context that will guide the development of new theories.¹⁸⁰ Further, the use of a theoretical framework will allow for the assessments of the reliability and the validity of the concepts to be measured.¹⁸⁵ Valid and reliable models are useful in the following ways: to aid researchers in understanding the complex relationships among the concepts, to educate health care providers on which domains of QoL have the greatest impact on patients' lives, to examine the relative importance of several approaches to patient care, and to help translate the clinical importance of QoL.¹⁸⁶

Despite the burden of disease and mortality in CLE patients, there have been few attempts to examine their QoL using any health behavioral theories. To this end, the

next sections will focus on the QoL models commonly used in chronic diseases with the intent of selecting a theoretical model that can be used to capture the burden of disease in CLE patients.

Examples of theoretical frameworks that have been used include those by Cella,¹⁸⁷ the World Health Organization International Classification of Functioning, Disability, and Health (WHO ICF),¹⁸⁸ Wilson and Cleary,¹⁸⁶ and Ferrans and colleagues.³

3.1.1 CELLA'S MULTIDIMENSIONAL QUALITY OF LIFE MODEL

Cella's model defines QoL in terms of domains of well-being, and it contains four domains: physical well-being, functional well-being, emotional well-being, and social well-being. Physical well-being was defined to represent a combination of disease symptoms, treatment side-effects, and general physical well-being as defined by the patient.¹⁸⁷ Functional well-being, although correlated with physical well-being, is conceptually different from physical dimensions. Further, functional well-being was defined as a person's ability to perform activities related to their personal needs, ambitions, or social role.¹⁸⁷ Some of these activities may include walking, bathing, feeding, or dressing oneself. Functional well-being incorporates one's ability to carry out responsibilities in and outside of the home, with families, friends and other social circles.

Emotional well-being reflects both positive well-being as well as negative well-being. A comprehensive QoL measure should assess both sides of this spectrum.

Finally, social well-being was described as a diverse construct that may include perceived social support, family relationships, intimacy, sexuality and inclusion of leisure activities. These four domains contribute to overall QoL and are subjective or self-perceived in nature. The overall scope of Cella's model is that these domains are the necessary building blocks that contribute to the dynamic concept of QoL, thereby giving researchers the opportunity to measure the contribution of each construct to the QoL concept. Also, all the domains within Cella's model make up the perceived QoL status of an individual; thereby the domains have the potential to impact directly the individual's overall QoL. A conceptualization of this model can be seen in Figure 3.1. Cella¹⁸⁹ describes three main purposes for assessing QoL in patients as: "a) to assess rehabilitation needs, b) as an endpoint in the evaluation of treatment outcome, and c) as a predictor of response to future treatment."¹⁸⁹ Cella's model has been used in HIV/AIDS patients with liver diseases,¹⁹⁰ as well as in patients with pruritus,¹⁹¹ and testicular cancer.¹⁹²

Henderson et al.¹⁹⁰ examined the relationship between Cella's four domains (physical, social, emotional, and functional well-being) and overall QoL in HIV patients with liver diseases. Their study was a cross-sectional, retrospective study that included a total of 80 patients recruited from a medical center. Overall QoL was measured using the Ferrans and Power Quality of Life Index (QLI).¹⁹³ The QLI is a 66-item instrument that measures both importance and satisfaction with life. All four domains in Cella's model were significantly correlated with overall QoL (functional, $r=0.329$, $p < .01$; social, $r = .636$, $p < .01$; emotional, $r = -.549$, $p < .01$; and physical, $r=.480$, $p < .01$). In

addition, all four domains accounted for approximately 53 percent of the variance in overall QoL ($R^2 = .532$).

Cella's model is not without its limitations: one drawback of its use is the way QoL is defined as overall "well-being." For example, physical well-being is a precursor to physical status, and physical status is dependent on certain health and physical symptoms that are associated with chronic and comorbid conditions.¹⁹⁴ Other limitations are that the model has no causal process, and there are no noted indications of the level of significance contributed by each of the domains that comprise overall QoL. Finally, the linkages between the domains are not specified, and other important QoL domains such as symptom status are excluded from the model.

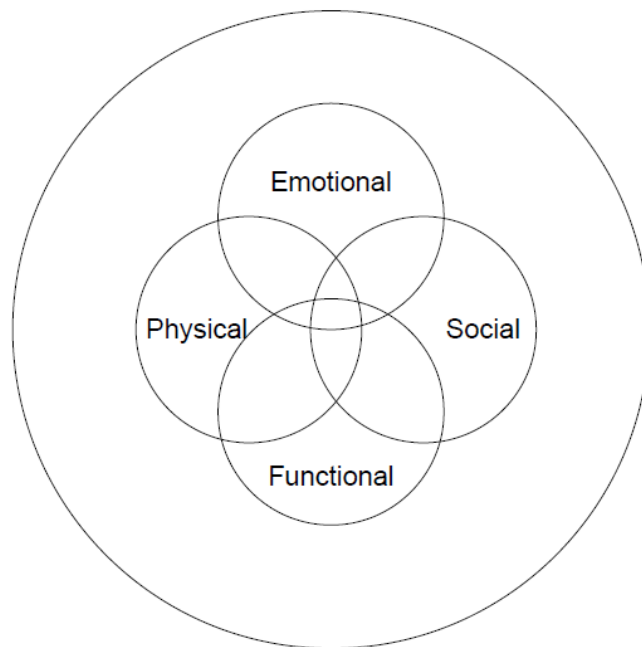


Figure 3.1: Cella's (1994) conceptualization of QOL

3.1.2 WORLD HEALTH ORGANIZATION INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY, AND HEALTH (WHO ICF)

The WHO ICF model defines components of health and some health-related components of well-being,¹⁹⁵ while providing a common and standard language that cuts across several disciplines and cultures.^{99,195,196} Since its inception in 1980, the model has evolved from focusing solely on “consequences of diseases” to “components of health.”^{195,196} The WHO ICF model has been used as follows: as a statistical tool (to collect and record data on population studies and surveys), as a clinical tool (in needs assessment and outcome evaluation), and as a research tool (to measure outcomes, environmental factors, and QoL).¹⁹⁵ As a research tool, the model has been used in QoL studies in diseases ranging from multiple sclerosis,¹⁹⁷ and oral health,¹⁹⁸ to physical impairments and disabilities.¹⁹⁹

The WHO ICF model contains two parts. Part 1 includes Functioning and Disability while Part 2 deals with Contextual Factors. Functioning and Disability focuses on body functioning and structures, activities and participation while contextual factors deal with environmental and personal factors. The main concepts represented in the WHO ICF models are well defined and contain clear assumptions [See Figure 3.2].

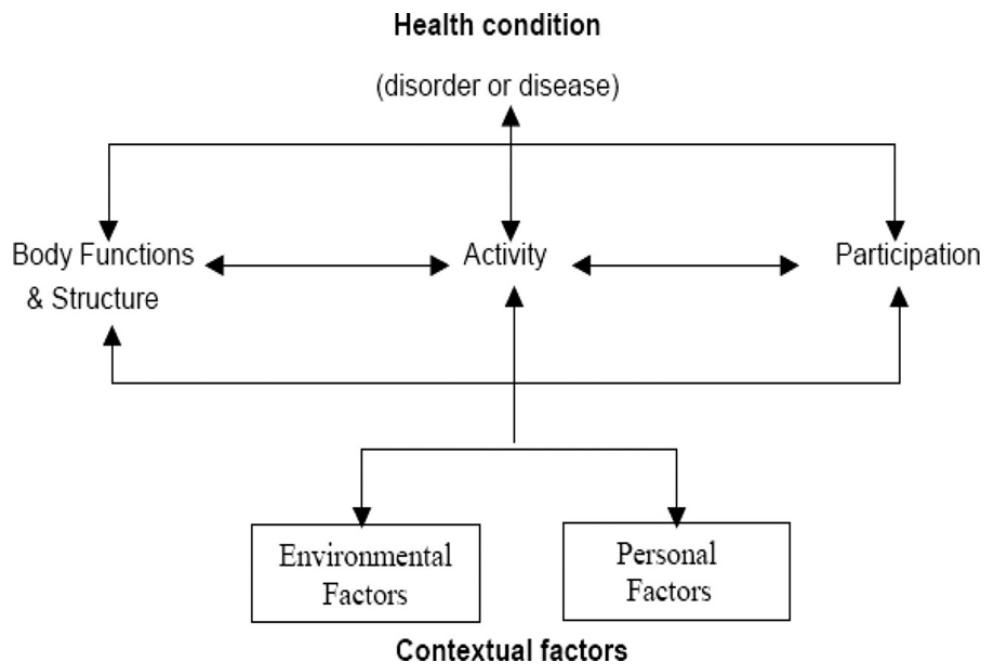


Figure 3.2: Diagrammatic representation of the WHO's ICF¹⁹⁵ showing interactions between the consequences of disease and contextual factors

The WHO ICF has the unique advantage of its wide range of applications above and beyond capturing QoL. This versatility has been captured in the literature.^{200,201} For example, the model was used in a study by Miller and colleagues²⁰¹ as a framework to organize an overview of nursing and interdisciplinary care of patients with stroke. Therein, the model was used more for its mapping and classification abilities, as opposed to it being used to generate hypotheses in QoL research. Nonetheless, the framework is not without its limitations. First, some overlap has been observed between activities and participation, and, as a result, making it difficult to separate these two concepts.²⁰² Second, it is not entirely unique to QoL research thus, it may not be used to capture QoL-related issues in certain disease conditions or states.²⁰² Finally, the ICF

puts more emphasis on functioning and disability, which may not be applicable in certain health conditions.

3.1.3 WILSON AND CLEARY QUALITY OF LIFE MODEL

The Wilson and Cleary model is an example of a disease-based, physiological framework that emphasizes the impact of disease and health on QoL. The conceptual model was developed to help explain the relationships among patient outcomes on a continuum from those that are proximal (e.g., clinical variables) to those that are distal to the disease (e.g., quality of life), within the context of individual and environmental characteristics [See Figure 3.3]. The model links biological and physiological factors, symptoms status, functioning, general health perceptions, and overall QoL. The model also links individual and environmental characteristics. Individual characteristics represent those variables that are intrinsic to the patient such as a patient's motivation or value preferences, while environmental characteristics, such as the amount of social, psychological or economic support, are extrinsic to the patient.

The Wilson and Cleary model organizes concepts in a context and enhances the understanding of new relationships among them,²⁰³ which have aided health care providers to identify and to assess appropriate patient outcomes that are relevant to patient care.²⁰⁴

While the model depicts that a linear relationship exists across the five concepts, Wilson and Cleary state that the unidirectional arrows between the concepts do not necessarily imply that reciprocal relationships cannot exist. Also, unidirectional arrows

between nonadjacent levels do not mean that there are no reciprocal relationships.¹⁸⁶ Prior to the development of this model, most QoL studies had limited or no theoretical basis.²⁰⁴

The Wilson and Cleary model has been used to assess QoL in patients with HIV/AIDS,²⁰⁴⁻²⁰⁶ kidney failure,²⁰⁷ stroke,²⁰⁸ coronary artery diseases,²⁰⁹ diabetes,²¹⁰ heart diseases,^{211,212} Hodgkin's lymphoma,²¹³ and stutter.²¹⁴

The model is the most widely-cited QoL model and can provide clinicians with a broader view of QoL than just biological factors and symptoms.²⁰² However, while the main concepts are well-defined, the individual and environmental factors do not have clear definitions.²⁰² Also, the model may not apply to individuals who have no orientation to the meaning of QoL and general health (e.g., children, comatose patients), and in those with limited functioning.²⁰²

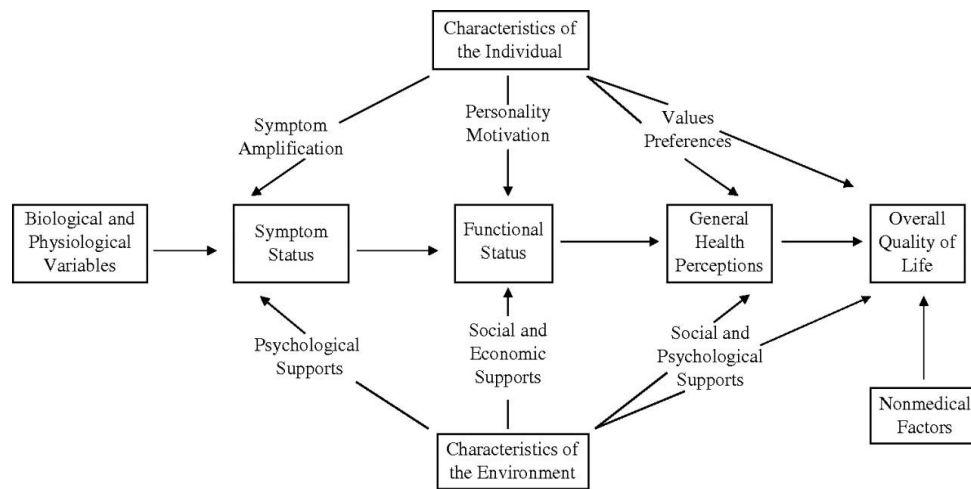


Figure 3.3: Relationships among Measures of Patient Outcomes Based on Wilson & Cleary Model

Due to the complex relationships depicted in the Wilson and Cleary Model, updated empirical evidence, and the need for further clarity, Ferrans and colleagues revised the Wilson and Cleary Model.³

3.1.4 FERRANS AND COLLEAGUES' REVISED WILSON AND CLEARY MODEL

Ferrans et al. used the Wilson and Cleary model as a guide to develop a revised QoL model.²¹⁵ Their modifications to the original model include: 1) explicitly stating that biological and physiological functions are influenced by characteristics of the environment and the individual; 2) removing the direct effect of nonmedical factors on QoL because all nonmedical factors can be assumed to be under characteristics of either the individual or environment; and 3) deleting the labels, such as value preferences, that connected the characteristic and environment to the major categories of symptoms, functional status, general health perceptions and overall QoL because these labels tended to restrict characterization of the relationships.²¹⁵

Just like in the original model, the revised model posits four main determinants of overall quality of life:²¹⁶ 1) biological and physiological factors (e.g., disease activity and disease damage, as measured by Cutaneous Lupus Activity and Severity Index [CLASI] scores); 2) symptom status, including physical and psychological symptoms (e.g., pain, itching, and hair loss); 3) functional status, which is a person's ability to perform tasks or functions (e.g., physical functioning, and role emotional); and 4) general health perceptions, which is a person's global perception of his/her own health.

Overall QoL is defined as the patient's overall satisfaction with life, beyond health-related quality of life (HRQoL). Further, characteristics of the individual (e.g., age, gender, and race/ethnicity) and characteristics of the environment (e.g., marital status, health insurance status, and residence area) influence the main QoL determinants, except biological/physiological factors, as well as overall QoL. The following sections describe each construct of the model in greater details.

3.1.4.1 BIOLOGICAL AND PHYSIOLOGICAL FACTORS

Wilson and Cleary¹⁸⁶ conceptualized biological/physiological factors as any measurable function of cells, organs, and organ systems of an individual. Also, these factors are assumed to have the greatest impact on health status and exert a limiting relative effect on more distal variables along the causal pathway. Biological/physiological factors include physiological processes that support life, and can be quantified through lab tests, physical assessments, and medical diagnosis. Changes made to the biological/physiological factors can subsequently impact all other determinants of QoL. Therefore, medical interventions often focus on this domain to improve health outcomes.

In most studies using the Revised Wilson and Cleary model, a small-to-moderate proportion of the total variance in overall QoL was accounted for by biological or physiological factors. For example, in a QoL study conducted in women with heart disease, biological factors accounted for 13 percent of the variance in QoL,²¹¹ while physiological factors accounted for 29 percent of QoL variance in another study

conducted in patients with AIDS.²¹⁷ In both studies, the R^2 contributed by either the biological or physiological factors was relatively smaller than that contributed by the other predictor variables.

Across studies, biological and physiological factors have been operationalized as composite measures based on: disease severity,²¹⁸ prognostic indicators,^{204,217,219-221} disease duration,^{217,219,221} and comorbid conditions,^{205,210,211,222} In the case of CLE, disease activity and damage (as measured by the CLASI), and disease duration are examples of biological/physiological factors that may impact QoL in persons with CLE.^{26,50}

3.1.4.2 SYMPTOM STATUS

Symptoms have been described by Wilson and Cleary as a “patient’s perception of an abnormal physical, emotional, or cognitive state,” and classified into 1) physical symptoms, 2) psychological symptoms, and 3) psychophysical.²²³ The model further suggests that biological and physiological factors, as well as characteristics of the individual and environment, have an impact on symptom status, although the effect of biological and physiological factors is unclear.²²³ Also, the influence of symptom status on QoL has been reported to be stable over time.^{217,224}

Heo et al.²¹⁰ reported that symptoms such as dyspnea and fatigue were key predictors of QoL and accounted for the largest proportion of variance in QoL in patients with heart failure. In a study by Sousa & Williamson²²⁴ conducted in adults with GI bleeding, symptoms related to GI bleeding accounted for a moderate proportion

of variance in QoL at baseline ($R^2=20.2\%$, $P<.01$) and one-month follow-up ($R^2=23.2\%$, $P<.01$). In persons with HIV/AIDS, the HIV-Problem Checklist, which was used to measure symptoms, accounted for 24 percent of the variance of QoL, a higher proportion of the variance compared to the other predictor variables.²²⁰

Contrary to the above studies, symptom status accounted for less than five percent of variance in QoL in HIV/AIDS patients in two studies by Portillo et al.²²⁵ and Phaladze et al.²²⁶ In both studies, an HIV symptom checklist (HIV/AIDS-TARGETED QoL (HAT-QoL) questionnaire) measured the frequency and intensity of HIV-related signs and symptoms.

In the study by Phaladze et al., stepwise multiple regressions were used to identify significant predictors when each measure was entered according to the order of precedence established by Wilson and Cleary. The overall model accounted for 53 percent of the variance in the overall QoL. An important finding from the study was that even though the average number of symptoms reported by participants was more than 17, the number of symptoms ceased being significant ($B=-.028$, $r^2=.186$) when functional status was entered into the regression model ($B=-.432$, $r^2=.492$). The limited explanatory power of symptom status may have been due to a potential measurement error in that the two measures (symptom status and functioning) may have been measuring the same phenomenon.

In another study, Portillo et al.²²⁵ suggested that difficulties with the overall measurement model may have been due to the floor-effects of their overall QoL measure – HAT-QoL or because of conceptual issues. Specifically, the authors

purported that even though the HAT-QoL measure is a disease-specific instrument developed to measure overall QoL (domains like overall functioning, life satisfaction, health worries, financial worries, and disclosure), it may not have adequately reflected the impact of the disease on a multiethnic study. The total variance explained by the model was 23 percent.

Sousa and Kwok²⁰⁴ further tested the Revised Wilson and Cleary model of QoL in patients living with AIDS (N=917). The study data was generated from an ongoing longitudinal, observational database of patients with an HIV-associated illness who were under the care of community-based providers. In this study, structural equation modeling was used to test the five concepts (biological/physiological factors, symptom status, functioning, general health perceptions, and overall QoL) in the model. Biological/physiological factors were operationalized as CD4 count; symptom status was measured using a revised version of the Sign and Symptom Checklist for Persons with HIV disease.²²⁷ The Health Assessment Questionnaire-Disability Index (HAQ-DI)²²⁸ was used to measure functioning. The HAQ-DI is a self-reported questionnaire that measures functional health over the previous week by asking a total of 20 questions in eight different categories: activities, reach, grip, eating, dressing, hygiene, walking and arising. General health perceptions were measured using a 100 mm visual analog scale that focuses on perceived health status. Overall QoL was measured by combining two-specific second-order factors including mental health and health worry.²²⁹ Using structural equation modeling (SEM), the authors simultaneously tested all of the causal relationships among the factors that comprised overall QoL. The results from the study

showed that the Revised Wilson and Cleary model fit the data, with each of the relationships between the higher order general factors being significant ($p < 0.05$). Based on modification indices, the authors were able to propose an alternative model linking symptom status directly with general health perceptions and overall QoL. Alternative models are generated to identify better fitting models that are more parsimonious.¹⁹⁴ Finally, symptom status is usually measured using disease-specific or symptom-specific instruments. The most common symptoms among patients with CLE include pain, pruritus, and fatigue.^{21,55,76}

3.1.4.3 FUNCTIONAL STATUS

Functional status is the next level in the Wilson and Cleary model. Functional status has been characterized as a person's ability to perform tasks or functions and adjust to his/her environment. Functional status can be assessed subjectively or objectively over a given period.¹⁸⁶ While symptom status is an immediate determinant of functioning, other aspects of an individual's personal and social environment (e.g., social support, medical treatment, access to care) may also have an impact on functioning.

Physical, social, role and psychological functioning are the four domains that are mainly used to assess functional status. While it is known that these four domains are not the only domains of interest to patients, health care providers, and researchers, they are the domains minimally required to assess functioning.^{230,231}

A cross-sectional, retrospective study by Phaladze et al.²²⁶ examined the meaning of QoL in people living with HIV/AIDS in four countries in Sub-Saharan Africa: Botswana, Lesotho, South Africa, and Swaziland. Using a convenience sample of 743 people, the authors implemented the Revised Wilson and Cleary model for categorizing variables, such as demographic characteristics and measures of severity of illness and examining their relationship to QoL, which was defined as life satisfaction in this study. Data was analyzed using hierarchical multiple regression, and results showed that subjects with higher life satisfaction scores were less educated, did not have an AIDS diagnosis or other comorbid conditions and had higher functioning scores. The combinations of variables in the model explained 53.2 percent of the variance in life satisfaction (QoL). Further, participants' self-reported overall functioning explained the greatest variance in life satisfaction (QoL), with a unique R^2 of almost 31 percent (30.6%).²²⁶

Kanters et al.²³² tested the Revised Wilson and Cleary model in a sample of 79 Dutch patients with Pompe disease at a medical center in Rotterdam, Germany. In this cross-sectional study, five factors in the model were operationalized as follows: biological/physiological factors by enzyme activity, muscle strength, and respiratory function; symptom status by fatigue; functional health by the Rotterdam Handicap Scale [RHS]²³³ (The RHS score ranges from 9 to 36, with higher scores indicating lower levels of handicap); general health perceptions by the EQ-5D Visual Analog Scale (EQ-5D VAS);²³⁴ and overall QoL by the SF-36.¹⁶⁷ The characteristics of the individual and the environment included age, gender, and disease duration. The data was analyzed

using multiple regression which showed that functional health was affected by fatigue, muscle strength and respiratory function. The overall model was significant and accounted for 35 percent of the variance in overall QoL ($R^2 = 0.352$; $p < .01$).

Orfila et al.²³⁵ assessed the relationships between 1) gender, 2) performance-based functional ability, 3) chronic diseases, and 4) sociodemographic variables and QoL (measured by the Nottingham Health Profile (NHP) questionnaire) among an elderly general population. The authors utilized sequential multiple linear regression analysis to test the Revised Wilson and Cleary model to examine the magnitude of the relationships among the variables in the model. The authors reported that functional capacity and depression were significantly related to overall QoL.

Psychological functions – including emotions and feelings (such as depression) and body image – and comorbidities are examples of concepts that have been reported to affect the functional status of patients with CLE.^{21,73,74,236} The impact of facial lesions and other CLE-related symptoms may result in social withdrawal and negatively affect emotional functioning.²³⁷

3.1.4.4 GENERAL HEALTH PERCEPTIONS

Wilson and Cleary defined general health perception as an overall subjective rating of health and represents an integration or synthesis of biological factors, symptom status, and functional status.²²³ The inclusion of a general health perceptions measure in a conceptual QoL model allows for additional subjective input that sums not only the biological/physiological function, symptoms status and functional status, but

also incorporates characteristics of the individual and his/her environment. Further, the addition of measures of general health perceptions may help explain a portion of QoL that is not captured by the other determinants in the model because of the complex nature of the QoL construct.

General health perceptions are purported to be among the best predictors of the use of general medical and mental health services.^{238,239} General health perceptions are exemplified as personal beliefs and evaluations of general health status.²⁴⁰ Measures of general health perceptions utilize available information from participants about their health, by taking into consideration the differences in preferences, values, needs, and attitude.²⁴⁰ Respondents are usually asked for an assessment of their health in general; this makes it possible to assess both the subjective information people have about their health and their evaluation of that information. For example, single-item measures ask the respondents to rate their perception of their current health status: “In general, how would you rate your present health” or “How do you feel about your own health?” Responses are scored on an ordinal scale from excellent to poor.²⁴¹ In line with the Revised Wilson and Cleary model of QoL, general health perceptions should be included in studies of QoL; overlooking such a measure could lead to an inability to capture a subjective, individualized but yet important component of QoL.

Janz et al.²¹¹ described the impact of clinical and psychosocial factors on the QoL of older women (n=570) with heart diseases, guided by the original Wilson and Cleary model. Overall QoL was measured by a single item asking participants “How has the overall quality of your life been during the past four weeks—that is, how have

things been going for you lately?” (1 = “not well at all” ... 5 = “very well”). The results indicated that all study model variables explained 46.8 percent of the variation in QoL, with general health perceptions accounting for 38 percent of this variance ($F=40.86$, $P<.01$, $R^2=.38$).

Some concepts of general health perceptions that are relevant to CLE patients include impact and satisfaction with treatment and concerns for the future. Medications used in CLE patients have dose-limiting toxicities, and patients have reported being concerned about the efficacy of their medications and the duration of effect as well as the negative side-effects of their medications.^{242,243} Also, increased pill burden is a concern for CLE patients due to the treatment of CLE sequelae such as pruritus or concomitant treatment of SLE.^{243,244} Finally, perception of overall skin health was assessed as a measure of general health perception.

3.1.4.5 CHARACTERISTICS OF THE INDIVIDUAL AND ENVIRONMENT

Characteristics of the individual (e.g., values and patient preferences) as well as the environment (e.g., social, economic, and psychological support) are recognized as factors affecting symptom status, functional status, general health perceptions and overall QoL.^{3,223} Ferrans and colleagues²¹⁵ revised the Wilson and Cleary model by adding pathways between characteristics of the individual and the environment as well as biological and physiological factors.

According to Wilson and Cleary, characteristics of the individual are specific descriptors of the person that are distinguishing traits, qualities, or identities of a human

being.²²³ Characteristics of the environment are a conglomerate of external conditions that include all tangible and intangible resources available in the individual's surroundings.²²³ For example, income and social support are examples of tangible and intangible resources, respectively, that are often associated with health outcomes.

In most regression models, characteristics of the individual and environment which are both conceptualized as demographic variables account for a minor proportion (< 10 %) of the outcome variable (QoL).^{210,222,245,246} For example, increasing age was a significant predictor of worse QoL in patients with heart failure but it only accounted for less than 10 percent of the variance ($F=40.86$, $P<.01$, Model $R^2=.36$).²⁴⁵ Lower education levels and poorer financial status – which were operationalized as characteristics of the individual and the environment – were linked to poor QoL in persons with advanced HIV in a study conducted in Sub-Saharan Africa,²⁰⁵ and in another multisite international study.²²⁵ In these two studies, the R^2 values accounted for by the demographic variables were also less than 10 percent.

Female gender,^{21,49,73} low SES (income),²¹ and being African American^{30,48} are examples of individual and economic factors that were associated with poor quality of life in CLE patients.

3.1.4.6 OVERALL QUALITY OF LIFE

Overall quality of life is the final component of the Wilson and Cleary Model. Given that the model itself assesses QoL, this particular measure could be regarded as the quintessential aspect of the model.²⁴⁷ The overall QoL measure differs from the

other measures because it provides the summation of all the components that come before it in the model. Overall QoL can be measured using a single global QoL item or through multiple-item scales assessing life satisfaction or happiness.²⁴⁷ The Spritzer Uniscale²⁴⁸ which is one of the most commonly used QoL measures, is an example of a measure using a single global question. The scale consists of a single item asking participants to: “Please rate your overall quality of life.” The Functional Assessment of Cancer Therapy/Functional Assessment in Chronic Illness Therapy (FACT/FACIT)²⁴⁹ and the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30)²⁵⁰ are other examples of global QoL questions. The item for FACT/FACIT is “I am content with the quality of my life right now,” and the EORTC QLQ-C30 states, “How would you rate your overall quality of life during the past week?”

Studies have reported that the overall QoL measure from the Wilson and Cleary model differs significantly from the other measures in the model, providing more robust information than symptoms, functioning, and general health perception.^{251,252} In a cross-sectional study conducted in 493 cognitively intact patients 80 years of age and older, Covinsky et al.²⁵² reported a lack of agreement between patient rating of their health and overall QoL. The authors reported that 43 percent of patients with the worst physical functioning reported their overall QoL to be good or better. Conversely, 15 percent of patients who reported their physical functioning as ‘best’ reported their QoL as only fair or poor. Additionally, 21 percent of patients with the least psychological distress rated their QoL to be fair or poor.

From a meta-analysis of 12 studies in chronic disease, Smith et al.²⁵¹ developed path models to demonstrate how patients make determinations of QOL and whether QOL is different from health status. The results from their study indicated that patients' perspectives, their overall QoL, and health status are different constructs. The authors further noted that when it comes to rating their QoL, patients place more importance on mental health rather than on physical functioning. The reverse was reported to be true for health status where patients give more emphasis to physical functioning than to mental health. A plausible explanation for these findings is that conclusions may differ significantly depending on whether the outcome of interest being measured is health status or overall QoL.²⁵¹ These findings provide a good argument for including overall QoL, in addition to other measures assessing symptoms status, functioning, and health status.

Vidrine, Amick, Gritz, and Arduino²⁰⁶ used a modified version of the Wilson and Cleary model in HIV patients from an outpatient clinic in Texas (N=348). In their study, four out of the five factors from the model were operationalized to reflect the population of interest. For example, biological/physiological factors were measured as self-reported nadir CD4 cell count; symptom status by the New England Medical Center (NEMC) pain scale;²⁵³ functional status by The Household and Leisure Time Activities Questionnaire (HLTA);²⁵⁴ and overall QoL by the Medical Outcomes Study (MOS) SF-12 health survey.²⁵⁵ The characteristics of the individual were measured by socioeconomic status, which was operationalized using two educational variables (years of education and educational attainment) and one occupational variable (a 6-item

ordinal hierarchy of functional attributes as defined by the 1970 US Census Bureau). The authors modified their model by the addition of a variable that assessed individual risk behaviors. These individual risk behaviors included smoking status, alcohol consumption, and illicit drug use. Structural equation modeling (SEM) was used to test simultaneously all of the causal relationships in the model. LISREL, an SEM software, was used to analyze the data and the authors reported that the Revised Wilson and Cleary model was well supported and fit the data, $\chi^2 (44) = 57.62$, $p=0.08$ and RMSEA (root mean square of approximation) = 0.03. (RMSEA <0.06 with an upper 90% confidence interval of <0.08 indicates good fit).^{256,257}

Hofer et al.²⁵⁸ used SEM to test the Revised Wilson and Cleary model in patients with coronary heart disease (N=465), who were recruited from a cardiology multicenter hospital in Austria. Overall QoL was measured using the MacNew Heart Disease Quality of Life Questionnaire.²⁵⁹ Data to measure all the determinants of QoL and overall QoL were collected from these patients at three different points of time (baseline evaluation, at 1-month and 3-month follow-up). The study's main goal was to find out whether the Revised Wilson and Cleary model applied to patients with coronary heart disease and is stable over time in this particular group of patients. At both baseline and over the other data collection points, the authors reported satisfactory fits of the model. The final model linked clinical variables, such as the number of diseased vessels and the number of risk factors, to global QoL through the mediating effects of the experience of actual symptoms (i.e., symptom status), physical functioning, and general health perceptions. Depression and anxiety symptoms exerted

the most significant influence on QoL. Their study findings provided empirical evidence for the Revised Wilson and Cleary theoretically-derived QoL model. The overall model explained at least 49 percent of the variance in subjective global QoL. Finally, the study findings support the use of SEM models in the investigation of the perception of QoL in patients with heart failure.²⁵⁸

Importantly, the Revised Wilson and Cleary model has been demonstrated to enhance knowledge about QoL in a range of diverse populations coping with long-term health issues.^{204,247,260,261} For example, Wyrwich and colleagues²⁶⁰ applied the Wilson and Cleary model to patients with generalized anxiety disorder, and the authors concluded that this model improved understanding and usefulness of health status for this population. Also, Ferrans,²⁴⁷ who employed this model to assess symptom management of patients in cancer trials, concluded that the use of an all-encompassing, multidimensional approach as the Revised Wilson and Cleary model yielded valuable information about patients' treatment experience and outcomes.²⁶¹ The revised model is depicted in Figure 3.4.

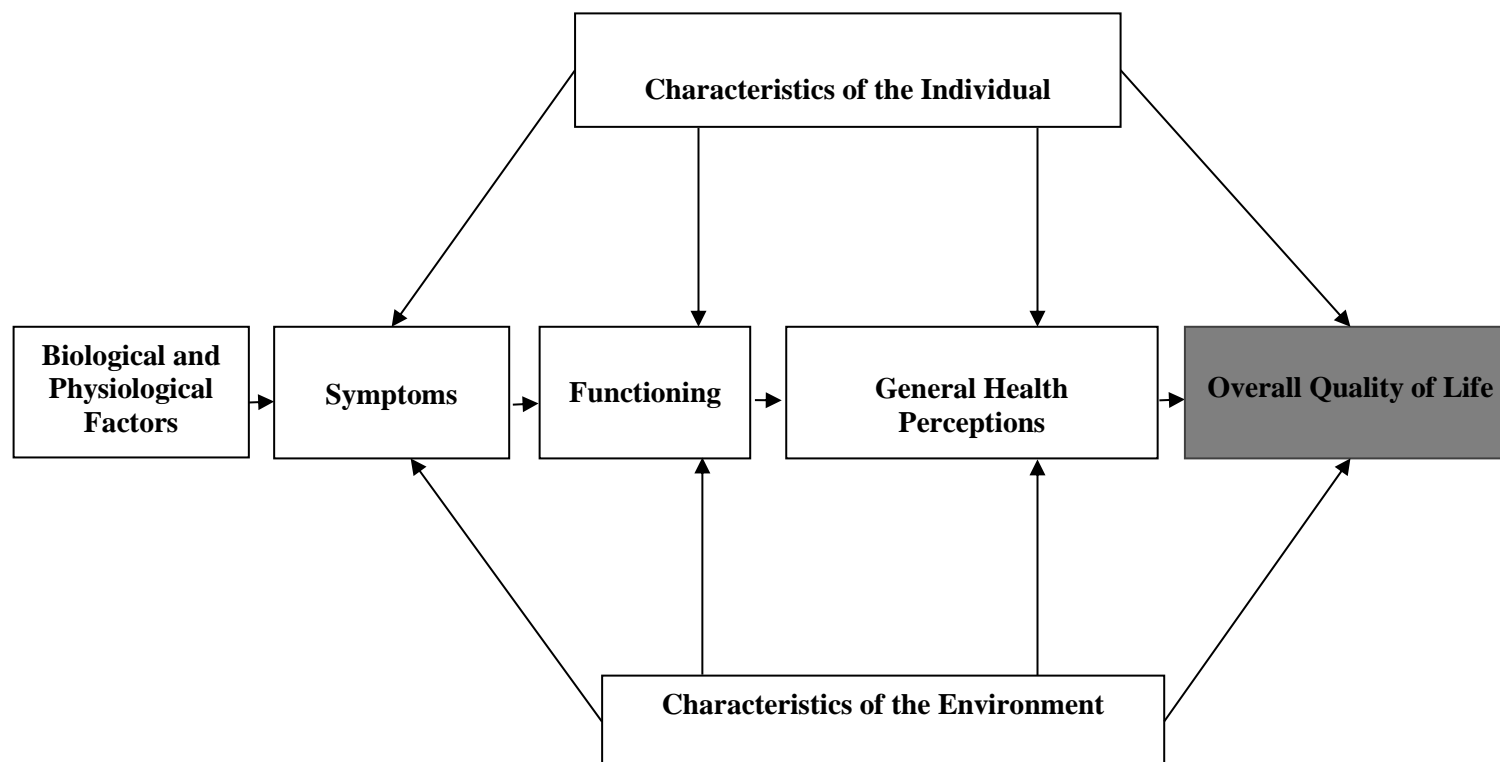


Figure 3.4: Relationships among Measures of Patient Outcomes Based on Ferrans' Revised Wilson & Cleary Model

3.2 STRENGTHS AND LIMITATIONS OF QoL IN CLE

The literature review captured the effects that CLE has on the QoL of patients, specifically the impact of the disease on the physical, psychological, functioning, and general health perception domains. Further, the literature review emphasized that the use of a theoretical framework is crucial in understanding the complex QoL construct. Several studies have examined QoL in patients with CLE.^{20,21,26,55,73,74,160,262} However, none of these studies have used a theoretical framework that clearly delineates the antecedents of QoL.²¹⁵ Further, no studies were identified using the Revised Wilson and Cleary model,²¹⁵ which was expanded to include a simplified conceptualization of and pathway to QoL. Also, no known studies have assessed biological/physiological functions, symptom status, functioning, general health perceptions, and various characteristics of the individual and the environment in CLE patients. Studies that used a more holistic measure of QoL in CLE patients, in the form of patient-reported outcomes, did not delineate a holistic theoretical framework to guide the inclusion or precedence of their study variables, thus further limiting the predictor variables used to explain QoL. Thus, future studies are needed to fill these knowledge gaps.^{20,21,26,55,73,74,160,262}

QoL research in CLE patients is scant and has mainly focused on operationalizing health-related QoL; this narrow conceptualization leaves a gap in our understanding of QoL in CLE patients and its influencing factors. Also, studies, which use QoL theoretical frameworks that incorporate relevant health-related factors as well as characteristics of the individual and the environment, are needed. Understanding QoL

through this holistic view with the use of theoretical framework will add to our understanding of QoL in patients with CLE.

3.3 SUMMARY

Research in rare diseases is limited by several methodological challenges, mainly due to insufficient statistical power as a result of small patient sample sizes.²⁶³ Despite these challenges, policy makers require information on the therapeutic value of therapies for rare diseases to support their reimbursement decisions.²⁶⁴ In the event of a lack of long-term follow-up data from sufficiently large sample sizes, as is likely in a rare disease like CLE, conceptual models can be used to describe the disease burden and factors important to QoL in patients. Such conceptual models aid the extrapolation of outcomes based on limited sample sizes, by combining data with known-disease specific correlations.²³² The theoretical framework chosen for this study to investigate the concept of QoL within the context of patients with CLE is the Revised Wilson and Cleary model by Ferrans et al.²¹⁵ While the model has been used in other disease populations,^{204,210,214,265} there is currently no known research on its use in patients with CLE. To this end, this dissertation addresses that gap in the literature.

The ultimate goal of methodically modeling QoL and its domains among patients with CLE is to identify empirically the domains of QoL that are adversely affected so as to tailor interventions specifically to this patient population. This is important to help these patients toward an improved overall QoL, knowing the significant negative effects of CLE on QoL.^{20,21,26,55,73,74,160,262} Further, the use of the Revised Wilson and Cleary

model will enable the linking of traditional clinical variables and concepts found in the literature to the pathways of the most relevant QoL concepts in CLE patients.²²³

All the studies reviewed in this chapter used either multiple regression to examine the explanatory power of the model or SEM to test the overall model in QoL studies. Analysis of variance was also an example of a statistical method frequently used in these QoL studies. There are no gold standard criteria for the critical appraisal of models using either regression analyses or SEM. For this study, multiple regression and analysis of variance models will be used to examine the relationship between overall QoL and its correlates. Figure 3.5 contains the theoretical path model listing the variables tested in this study.

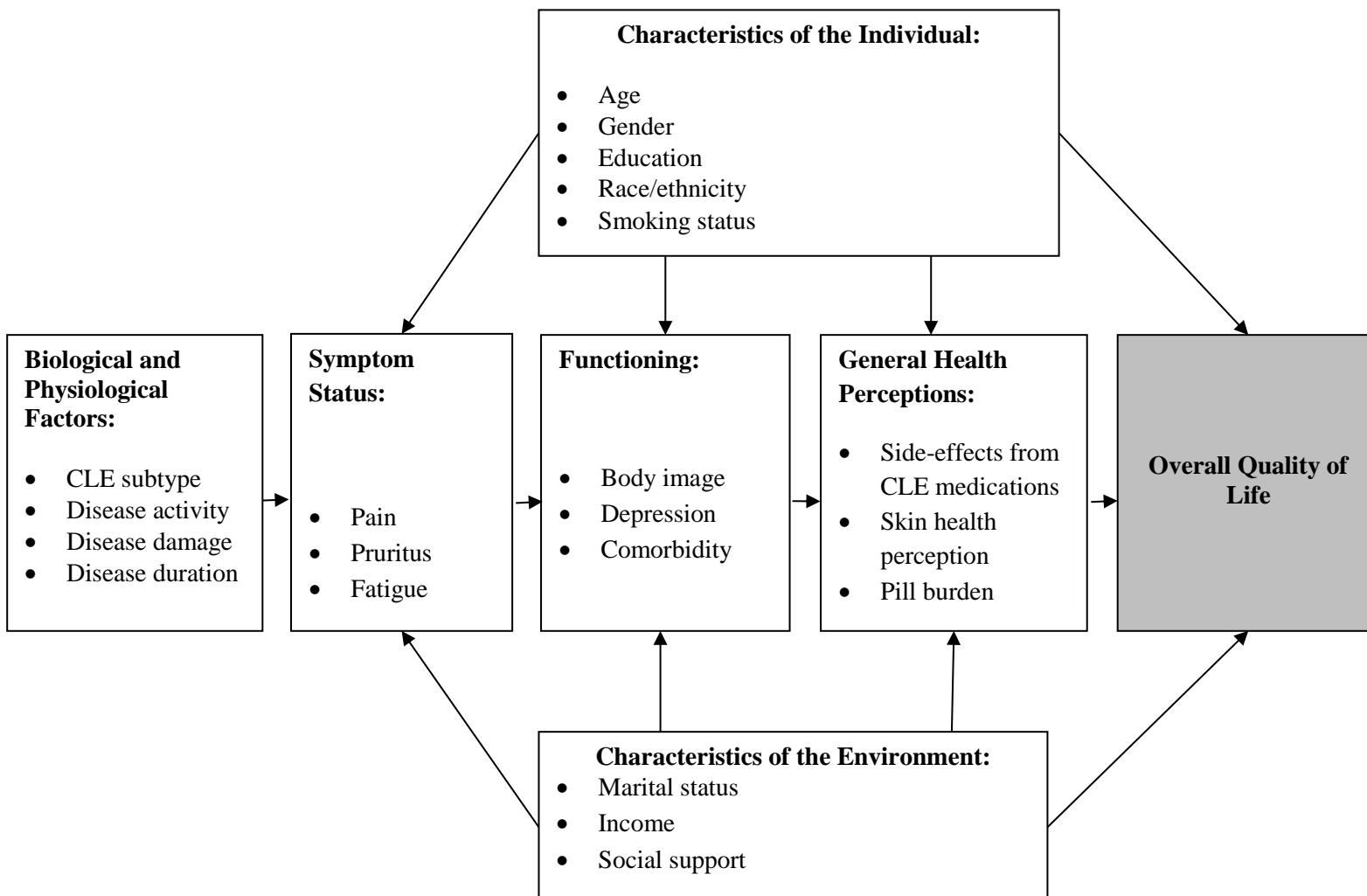


Figure 3.5: The Revised Wilson and Cleary Model by Ferrans et al.³

3.4 STUDY OBJECTIVES AND HYPOTHESES

The objectives and hypotheses for the study are detailed below and will be tested using two specified models based on the following two measurements of QoL. The dependent measure of QoL for Model 1 is the newly-developed CLEQoL and for Model 2 is the SF-36.

Objectives and Hypotheses

The specific objectives and hypotheses of this study are:

Objective 1: To describe participants' biological and physiological factors (CLE subtype, disease activity, disease damage, and disease duration), symptom status, (pain, pruritus, and fatigue), functioning (body image, depression, and comorbidity), general health perceptions (side-effects from CLE medications, skin health perception, and pill burden), characteristics of the individual (age, gender, education, race/ethnicity, and smoking status), characteristics of the environment (marital status, income, and social support), and overall QoL (CLEQoL and SF-36).

Objective 2: To determine the predictive ability of biological and physiological factors (CLE subtype, disease activity, disease damage, and disease duration), symptom status (pain, pruritus, and fatigue), functioning (body image, depression and comorbidity), and general health perceptions (side-effects from CLE medications, skin health perception, and pill burden) in explaining overall QoL in patients with CLE while controlling for

characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and characteristics of the environment (marital status, income, and social support).

H_{2A}: Biological and physiological factors (CLE subtype, disease activity, disease damage, and disease duration), symptom status (pain, pruritus, and fatigue), functioning (body image, depression, and comorbidity), and general health perceptions (side-effects from CLE medications, skin health perception, and pill burden) will explain a significant amount of variance in overall QoL (CLEQoL and SF-36) while controlling for characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and characteristics of the environment (marital status, income, and social support).

H_{2B1}: Biological and physiological factors (CLE subtype, disease activity, disease damage, and disease duration) will be *positive* and significant predictors of *overall QoL (CLEQoL)* while controlling for symptom status (pain, pruritus, and fatigue), functioning (body image, depression, and comorbidity), general health perceptions (side-effects from CLE medications, skin health perception, and pill burden), characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and characteristics of the environment (marital status, income, and social support).

H_{2B2}: Biological and physiological factors (CLE subtype, disease activity, disease damage, and disease duration) will be *negative* and significant predictors

of *overall QoL (SF-36)* while controlling for symptom status (pain, pruritus, and fatigue), functioning (body image, depression, and comorbidity), general health perceptions (side-effects from CLE medications, skin health perception, and pill burden), characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and characteristics of the environment (marital status, income, and social support).

H_{2C1}: Symptom status (pain, pruritus, and fatigue), will be *positive* and significant predictors of *overall QoL (CLEQoL)* while controlling for biological and physiological factors (CLE subtype, disease activity, disease damage, and disease duration), functioning (body image, depression, and comorbidity) general health perceptions (side-effects from CLE medications, skin health perception, and pill burden), characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and characteristics of the environment (marital status, income, and social support).

H_{2C2}: Symptom status (pain, pruritus, and fatigue), will be *negative* and significant predictors of *overall QoL (SF-36)* while controlling for biological and physiological factors (CLE subtype, disease activity, disease damage, and disease duration), functioning (body image, depression, and comorbidity) general health perceptions (side-effects from CLE medications, skin health perception, and pill burden), characteristics of the individual (age, gender,

education, race/ethnicity, and smoking status) and characteristics of the environment (marital status, income, and social support).

H_{2D1}: Functioning (body image, depression, and comorbidity) will be *positive* and significant predictors of *overall QoL (CLEQoL)* while controlling for biological and physiological factors (CLE subtype, disease activity, disease damage, and disease duration), symptom status (pain, pruritus, and fatigue), general health perceptions (side-effects from CLE medications, skin health perception, and pill burden), characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and characteristics of the environment (marital status, income, and social support).

H_{2D2}: Functioning (body image, depression, and comorbidity) will be *negative* and significant predictors of *overall QoL (SF-36)* while controlling for biological and physiological factors (CLE subtype, disease activity, disease damage, and disease duration), symptom status (pain, pruritus, and fatigue), general health perceptions (side-effects from CLE medications, skin health perception, and pill burden), characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and characteristics of the environment (marital status, income, and social support).

H_{2E1}: General health perceptions (side-effects from CLE medications, skin health perception, and pill burden) will be *negative* and significant predictors of *overall QoL (CLEQoL)* while controlling for biological and physiological

factors (CLE subtype, disease activity, disease damage, and disease duration), symptom status (pain, pruritus, and fatigue), functioning (body image, depression, and comorbidity), characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and characteristics of the environment (marital status, income, and social support).

H_{2E2}: General health perceptions (side-effects from CLE medications, skin health perception, and pill burden) will be *positive* and significant predictors of *overall QoL (SF-36)* while controlling for biological and physiological factors (CLE subtype, disease activity, disease damage, and disease duration), symptom status (pain, pruritus, and fatigue), functioning (body image, depression, and comorbidity), characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and characteristics of the environment (marital status, income, and social support).

Objective 3: To determine if symptom status (pain, pruritus, and fatigue) is related to biological and physiological factors (CLE subtype, disease activity, disease damage, and disease duration), characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and characteristics of the environment (marital status, income, and social support).

H_{3A}: There is no association between biological and physiological factors (CLE subtype, disease activity, disease damage, and disease duration) and symptom status (pain, pruritus, and fatigue).

H_{3B}: There is no association between characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and symptom status (pain, pruritus, and fatigue).

H_{3C}: There is no association between characteristics of the environment (marital status, income, and social support) and symptom status (pain, pruritus, and fatigue).

Objective 4: To determine if functioning (body image, depression, and comorbidity) is related to symptom status (pain, pruritus, and fatigue), characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and characteristics of the environment (marital status, income, and social support).

H_{4A}: There is no association between symptom status (pain, pruritus, and fatigue) and functioning (body image, depression, and comorbidity).

H_{4B}: There is no association between characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and functioning (body image, depression, and comorbidity).

H_{4C}: There is no association between characteristics of the environment (marital status, income, and social support) and functioning (body image, depression, and comorbidity).

Objective 5: To determine if general health perceptions (side-effects from CLE medications, skin health perception, and pill burden) is related to functioning (body image, depression, and comorbidity), characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and characteristics of the environment (marital status, income, and social support).

H_{5A}: There is no association between functioning (body image, depression, and comorbidity) and general health perceptions (side-effects from CLE medications, skin health perception, and pill burden).

H_{5B}: There is no association between characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and general health perceptions (side-effects from CLE medications, skin health perception, and pill burden).

H_{5C}: There is no association between characteristics of the environment (marital status, income, and social support) and general health perceptions (side-effects from CLE medications, skin health perception, and pill burden).

Objective 6: To compare the predictive ability of each of the two models (Model 1 – CLEQoL and Model 2 – SF-36), in patients with CLE according to the proposed theoretical framework of the Revised Wilson and Cleary Model.

H_{6A}: The model with CLEQoL (Model 1) as the dependent variable will have a

higher predictive ability than the model with SF-36 (Model 2), using the Williams's t -tests.

CHAPTER FOUR: METHODOLOGY

The purpose of this study was two-fold: a) to describe the quality of life (QoL) in patients with Cutaneous Lupus Erythematosus (CLE) and b) to identify the factors associated with quality of life QoL in these patients using the Revised Wilson and Cleary Model. This chapter is divided into nine major sections: Study Design, Sample Selection, Instrument Development, Study Variables, Survey Pretest, Instrument Distribution, Data Analyses, Hypotheses Statistical Tests, Limitations, and Summary.

4.1 STUDY DESIGN

This study employed a multi-method, multi-phase approach via: 1) use of focus groups (FGs) to determine the impact of CLE on patients' lives, and 2) a cross-sectional, non-experimental design to determine factors related to QoL in patients with CLE. The FGs were used to explore, describe and clarify the patients' perspective of how CLE has impacted their lives, and examine patients' perceptions of unmet needs regarding CLE treatment and care.

Self-report paper-pencil surveys were used to measure the relationships between previously described factors and QoL in patients with CLE. A cross-sectional design is best used to examine data at one point in time and to describe the status of phenomena and/or the relationships among these phenomena.²⁶⁶ Data were collected at one point from patients to describe their current level of QoL, as well as factors affecting their QoL.

4.2 PATIENT RECRUITMENT

Due to CLE being a rare disease, patients were recruited via the registry maintained by the University of Texas (UT) Southwestern Medical Center. The sites for data collection were the University of Texas (UT) Southwestern Medical Center and Parkland Health and Hospital System, both in Dallas, with over 200 patients with CLE. CLE patients were validated according to the four (malar rash, discoid lesions, oral ulcers, and photosensitivity) of the 11 criteria for CLE outlined by the American College of Rheumatology.^{14,267}

For the focus groups, patients, from this registry, who have indicated that they are interested in being contacted for future research projects, who met the inclusion criteria (see below), and were local residents (within an hour of the data collection site) were invited to participate in the study. Out of considerations for transportation concerns to the data collection site, only patients who lived in the Dallas area were contacted to participate in the study. Non-registry patients were also recruited during their clinical visits to the hospital.

For the final survey data collection, patients who met the inclusion criteria (see below) were recruited during their clinical visits to the hospital as well as from the patient registry of CLE patients. Clinical staff from both hospitals in Dallas also assisted in recruiting non-registry patients during their clinic visits. These patients were asked if they would be interested in participating in a study about CLE and how it affects them.

4.2.1 INCLUSION AND EXCLUSION CRITERIA

The inclusion criteria in this study were as follows:

- Patients, who have a diagnosis of CLE;
- Must have had a clinic visit within the past two years;
- Aged 18 years and above; and
- Ability to give informed consent.

The exclusion criteria in this study were as follows:

- Patients with no CLE diagnosis;
- Not had a clinic visit within the last two years; and
- Under 18 years of age; and
- Not capable of giving informed consent.

4.2.2 IRB PROCEDURES

This study was conducted within accordance of the guidelines set forth by the institutional review boards (IRBs) at both UT at Austin (2015-09-0041) and UT Southwestern (STU 102015-056 and STU 082010-241). Because this study involved human subjects, two applications – one for the FGs and a separate submission for the paper-pencil surveys – were submitted for approval by the IRBs at both universities.

To protect the confidentiality of the participants, informed consent statements were provided at the beginning of data collection. These consent forms were reviewed and completed by each participant before data collection.

4.3 INSTRUMENT DEVELOPMENT

The instrument employed in this study was guided by the Revised Wilson and Cleary model. The constructs from the model used in this study were biological and physiological factors, symptom status, functioning, general health perceptions, characteristics of the individual and environment, and overall QoL. The revised measure of overall QoL was elicited from focus group interviews and select questions from the instruments – VitiQoL¹⁵⁷ and Skindex 29+3.^{21,22,26} All study participants were compensated with \$10 gift cards for their participation.

4.3.1 FOCUS GROUPS

Three FGs were conducted to capture the disease burden and QoL in patients with CLE. Six to ten CLE patients were recruited [See Appendix A] for each group and patients were compensated with \$50 VISA gift cards for their participation in a 1 to 1.5 hour FG session. The FGs were divided into three portions. The first portion was devoted to introductions, filling out consent forms, and administration of brief survey questions. The pre-focus group demographic survey [See Appendix B] gathered information on gender, age, education level, race/ethnicity, marital status, smoking status, insurance status, and residency area.

The second part entailed the main discussion of the FG topics beginning with a description of the study purpose. Using the moderator guide [See Appendix C], FG participants were asked open-ended questions about how CLE affects their overall QoL. For example, questions were used to assess how CLE affects patients by first asking

participants to write down all the ways that CLE affects them.⁵³ When necessary, probes were used to ascertain how CLE affects their work life, daily activities, social life, personal relationships, or leisure activities, as well as to determine the impact of photosensitivity, alopecia, and mental health.⁵³

In the third part of the FG, participants were handed copies of the Skindex-29+3²⁹ [See Appendix D] and VitiQoL¹⁵⁷ [See Appendix E] instruments and were asked to review the items on the questionnaire. Feedback was received on their relevance to CLE and suggestions were solicited regarding items that can be added to the instruments to make them more relevant to CLE. The Skindex-29+3^{21,22,26} contains 32 items but item 18 about side-effects from treatment is not scored. Symptoms, emotions, functioning, and lupus-specific concerns (such as alopecia and photosensitivity) are the four domains measured in the Skindex-29+3. VitiQoL has 15 items and focuses on three domains – participation limitation, stigma, and behavior. These two instruments were chosen due to their clinical and content relevance to CLE, such as emphasis on skin-specific domains like emotions, symptoms, and functioning.

FGs have been shown to be a beneficial tool to use when obtaining information about some phenomenon from a target population, as well as to create an environment that allows participants to express themselves freely.²⁶⁸ According to Rabiee,²⁶⁹ FGs are used to explore complex decisions and behaviors within the context of day-to-day living. They are also used to generate a larger amount of data compared to one-on-one interviews.²⁶⁹ FGs were audiotaped, and the content was analyzed by three coders independently. The use of FGs increased the likelihood of identifying all health issues

relevant to CLE patients and also highlighted emergent overall QoL issues that may not have been captured during the literature review. Finally, findings from the FGs were used to create the overall QoL measure relevant to CLE patients. The focus group sessions were all conducted in February 2016.

4.3.2 DATA ANALYSIS

Thematic analysis was chosen as the methodology to analyze the FG data because its interpretive process helps to identify common themes and to achieve understanding.²⁷⁰ Specifically, the thematic analysis guidelines by Braun and Clarke were used to analyze the FG transcripts.²⁷¹ The guidelines are divided into six phases: a) familiarizing with the data, b) extracting initial codes, c) generating themes, d) reviewing the themes, e) defining and naming themes, and f) producing the report. Data analysis was conducted using Dedoose software.²⁷² Validity checks were conducted throughout the data analysis by checking and re-checking the concepts. Using topic coding, recurring concepts and phrases were grouped into codes, and then sub-themes, which were placed under overarching themes/categories. Three coders, trained in qualitative research methods, independently pre-tested the definitions of the themes/categories by thoroughly reviewing the transcripts. Results were compared among the three coders and discrepancies were resolved through discussion.

Finally, the demographic survey responses were analyzed using descriptive statistics (e.g., frequencies, means and standard deviations) to characterize FG study participants.

4.4 STUDY VARIABLES

The assessment of QoL and its components in this study included the use of standardized and disease-specific questionnaires. This study operationalized the five main components of the Revised Wilson and Cleary model²¹⁵ as follows:

- *Biological/physiological factors*: CLE subtype (ACLE, SCLE, DLE, Tumid lupus, Lupus panniculitis), disease activity and damage (as measured by Cutaneous Lupus Disease Area and Severity Index (CLASI)), and disease duration.
- *Symptoms status*: Pain, pruritus and fatigue numerical rating scales (NRS).
- *Functional status*: Body image, depression, and comorbidity.
- *General health perceptions*: Side-effects from CLE medications, skin health perception, and pill burden.
- *Characteristics of the individual*: Age of participants (in years), gender (male or female), education (current classification), race/ethnicity (African American/Black, Asian, Caucasian, Hispanic, and Other), and smoking status (current smoker, former smoker, and never smoker).
- *Characteristics of the environment*: Marital status (single, divorced, married/domestic partner, widowed, or separated), income (using ZIP codes and median household income) and social support].

Finally, measures for biological/physiological factors were collected by the physician and through retrospective medical chart reviews with the clinical staff. Once collected, these measures were linked, using unique patient IDs, with the measures for

the remaining factors – symptom status, functioning, general health perception, and overall QoL, which were all patient self-report measures.

4.4.1 DEPENDENT VARIABLES

Overall QoL was measured using two separate scales. Based on the WHO recommendations for the development of QoL measures, a disease-specific instrument (CLEQoL, created from focus group findings and other instruments) [See Appendix F] and a generic instrument (SF-36) [See Appendix G] served as the measures for overall QoL in the current study. CLEQoL was adapted from the Skindex 29+3, VitiQoL, and from content analyses of FG findings in CLE patients. Finally, use of the CLEQoL in addition to SF-36 in measuring QoL in CLE patients will provide complementary and comprehensive information.

4.4.1.1 CUTANEOUS LUPUS ERYTHEMATOSUS QUALITY OF LIFE (CLEQoL)

The CLEQoL is a 36-item quality of life measure for CLE; it includes 32 items from the Skindex-29+3 (but item 18 about side-effects of treatment is not scored),^{21,22,26} a previously validated skin-specific QoL survey and four items from VitiQoL.¹⁵⁷ The Skindex 29+3^{21,22,26} scale consists of three domains: symptoms, emotions, and functioning,²⁹ and three additional questions to assess lupus-specific concerns (such as photosensitivity and alopecia).^{26,273} The additional questions from VitiQoL assess photoprotection practices and body image. Similar to the Skindex-29+3, the CLEQoL

assessed how often (Never, Rarely, Sometimes, Often, All the time) during the previous four weeks the patient experienced the effect described in each item. Scores of 0 (never), 25 (rarely), 50 (sometimes), 75 (often), and 100 (all the time) are assigned to each question and averaged to determine each domain score from 0-100, with higher scores indicating poorer QoL.

4.4.1.2 SHORT-FORM (SF)-36

The SF-36 measures responses to eight subscales (36 items) relating to general health including physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional and mental health. Each subscale is transformed onto a 0–100 scale and converted into a norm-based score (using a mean of 50 and a SD of 10 for the U.S. general population), allowing for comparison of scores to other medical conditions.^{21,54} Two overall summary scores were obtained – Physical Component Summary (PCS) and Mental Component Summary score (MCS) scores. Summary scores were transformed to have a mean of 50 and standard deviation of 10, with higher scores indicating a higher QoL.

The SF-36 has evidence of acceptable reliability (internal consistency), construct validity (convergent and known-groups) and the ability to detect change (responsiveness and sensitivity to change) in other dermatological diseases as well as other disease states.¹⁶⁸⁻¹⁷⁷

4.4.2 INDEPENDENT VARIABLES

4.4.2.1 BIOLOGICAL/PHYSIOLOGICAL FACTORS

The measures for biological/physiological factors were assessed by the physician and collected at the time of each patient visit to the clinic or in retrospective chart reviews with the clinical staff.

Specifically, biological and physiological factors were examined using: 1) the clinician-reported outcome measure, the Cutaneous Lupus Erythematosus Disease Area and Severity Index (CLASI)⁵⁰ to assess both disease activity and damage, 2) CLE subtype, and 3) disease duration. The CLASI [See Figure 4.1] is designed as a table where the rows represent anatomical areas, and the columns score major clinical symptoms. The CLASI tool yields two scores: total CLASI activity and total CLASI damage.⁵⁰

Total CLASI activity and damage scores were derived from the arithmetic sum of each of the individual scores on items in a given cutaneous activity field. Activity was scored on the basis of erythema (13 items; scored on scale of 0-3 with a possible score ranging from 0-39), scale/hypertrophy (13 items; scored on scale of 0-2 with a possible score ranging from 0-26), mucus membrane involvement (coded as '0' for absent and '1' for presence of lesion or ulceration), acute hair loss (coded as '0' for no and '1' for yes), and non-scarring alopecia (coded as '0' for absent, '1' for diffuse; non-inflammatory, '2' for focal or patchy in one quadrant, and '3' for focal or patchy in more than one quadrant). The total CLASI activity scores can range from 0 to 70, with higher scores denoting greater disease activity.⁴⁶ Severity groups are indicated by the

following CLASI activity score ranges: mild (0-9), moderate (10-20), and severe (21-70).²³⁶ Similarly, the total CLASI damage score was the arithmetic sum of the items rated by per body region for damage caused by dyspigmentation, scarring/atrophy/panniculitis, and scarring of the scalp. Scores can range from 0 to 70, with higher scores indicating greater disease damage.⁴⁶ The CLASI has been reported to have an intraclass correlation coefficient for inter-rater reliability of 0.86 – 0.90 for the activity score and of 0.90 – 0.92 for the damage score.^{46,50}

CLE subtype was assessed by acute (ACLE), subacute (SCLE), chronic (DLE, Tumid lupus, Lupus panniculitis), and Other; CLE subtype was then recoded into two categories: DLE vs non-DLE. Disease duration was assessed through reviews of patients' medical records to determine how long they have been diagnosed with CLE by subtracting the date of their last clinical visit from the biopsy date.


Select the score in each anatomical location that describes them ost severely affected cutaneous lupus-associated lesion

Extent	activity			damage		
	Anatomical Location	Erythema	Scale/Hypertrophy	Dyspigmentation	Scarring/Atrophy/Panniculitis	Anatomical Location
		0-absent 1-pink; faint erythema 2- red; 3-dark red; purple/violaceous/ crusted/ hemorrhagic	0-absent; 1-scale 2-verrucous/ hypertrophic	0-absent, 1-dyspigmentation	0 – absent 1 – scarring 2 – severely atrophic scarring or panniculitis	
	Scalp				See below	Scalp
	Ears					Ears
	Nose (incl. malar area)					Nose (incl. malar area)
	Rest of the face					Rest of the face
	V-area neck (frontal)					V-area neck (frontal)
	Post. Neck &/or shoulders					Post. Neck &/or shoulders
	Chest					Chest
	Abdomen					Abdomen
	Back, buttocks					Back, buttocks
	Arms					Arms
	Hands					Hands
	Legs					Legs
	Feet					Feet

Mucous membrane

Mucous membrane lesions (examine if patient confirms involvement)	Report duration of dyspigmentation after active lesions have resolved (verbal report by patient – tick appropriate box)
0-absent; 1-lesion or ulceration	<input type="checkbox"/> dyspigmentation usually lasts less than 12 months (The dyspigmentation score above remains the same) <input type="checkbox"/> dyspigmentation usually lasts at least 12 months (The dyspigmentation above score is multiplied by two)

Alopecia

Recent Hair loss (within the last 30 days / as reported by patient)		NB: if scarring and non-scarring aspects seem to coexist in one lesion, please score both
1-Yes 0-No		
Divide the scalp into four quadrants as shown. The dividing line between right and left is the midline. The dividing line between frontal and occipital is the line connecting the highest points of the ear lobe. A quadrant is considered affected if there is a lesion within the quadrant.		
Alopecia (clinically not obviously scarred)	Scarring of the scalp (judged clinically)	
0-absent 1-diffuse; non-inflammatory 2-focal or patchy in one quadrant; 3-focal or patchy in more than one quadrant	0- absent 3- in one quadrant 4- two quadrants 5- three quadrants 6- affects the whole skull	

Total Activity Score
(For the activity score please add up the cores
of the left side i.e. for Erythema, Scale/Hypertrophy,
Mucous membrane involvement and Alopecia)

Total Damage Score
(For the damage score, please add up the cores
of the right side, i.e. for Dyspigmentation,
Scarring/Atrophy/Panniculitis and Scarring
of the Scalp)

Figure 4.1: The Cutaneous Lupus Erythematosus Disease Area and Severity Index (CLASI)

4.4.2.2 SYMPTOM STATUS

Symptom status was assessed using unidimensional scales^{274,275} to measure symptom-related issues of pain, fatigue and pruritus. Examples of unidimensional scales are the Verbal Rating Scale (VRS), the Visual Analog Scale (VAS), and the Numerical Rating Scale (NRS). These three examples are the most widely used methods for assessing subjective symptoms like pain,²⁷⁶ fatigue,²⁷⁷ and pruritus.^{274,278} In this study, the NRS format was used to measure symptom status as this format has been shown to be well accepted in patient populations and it also provides a better assessment than the VAS or the VRS.²⁷⁸

4.4.2.2.1 NUMERICAL RATING SCALE (NRS) FOR PAIN

The NRS for pain is a unidimensional measure of pain intensity in adults.^{279,280} Although various versions exist, the most commonly used is the variant developed by Farrer and colleagues²⁸¹ – the pain intensity numeric rating scale (PI-NRS). The PI-NRS is a segmented numeric version in which respondents choose a whole number (0-10 integers) that best describes the intensity of their pain.²⁸⁰ Similar to the pain VAS, the PI-NRS is anchored at both ends with extreme measures describing pain intensity.^{279,280} The PI-NRS is a single 11-point numeric scale with 0 representing one pain extreme (e.g., “no pain”) and 10 representing the other pain extreme (e.g., “pain as bad as you can imagine”). Higher scores indicate greater pain intensity. The scale has a recall period of the last 24 hours. High test–retest reliability ($r = 0.95 - 0.96$) has been reported in other patient populations and the scale has demonstrated good

construct validity as it was highly correlated to the VAS in patients with chronic pain (correlations range from 0.86 to 0.95). Using the PI-NRS, in this study, pain was measured as:

Directions: Please circle the one number on the scale that best answers the question.

On average, how much **PAIN** have you experienced in the **last 24 hrs?**

0	1	2	3	4	5	6	7	8	9	10
No pain										
Pain as bad as you can imagine										

4.4.2.2.2 NUMERICAL RATING SCALE (NRS) FOR PRURITUS/ITCH

The Worst Itch Numeric Rating Scale (WI-NRS) was used to assess pruritus/itch. It was originally developed to measure the severity of itching in patients with psoriatic skin conditions.²⁸² The WI-NRS is a single 11-point numeric scale with 0 representing “no itching” and 10 representing “itch as bad as you can imagine.” Higher scores indicate higher itch severity. The scale has a recall period of the last 24 hours. No psychometric properties have been reported for the scale. Similar to the WI-NRS, itching was measured in this study as shown below:

Directions: Please circle the one number on the scale that best answers the question.

On average, how much **ITCH** have you experienced in the **last 24 hrs?**

0	1	2	3	4	5	6	7	8	9	10
No itch										
Itch as bad as you can imagine										

4.4.2.2.3 NUMERICAL RATING SCALE (NRS) FOR FATIGUE

The NRS for fatigue has been used in patients with stroke,²⁸³ multiple sclerosis,²⁸⁴ fibromyalgia,²⁸⁵ ankylosing spondylitis,²⁸⁶ and cancer.²⁸⁷ For this study, the Worst Fatigue – Numeric Rating Scale (WF-NRS)²⁸⁶ was used to assess the severity of fatigue during the previous 1-week period. The WF-NRS has been validated for assessing fatigue severity in patients with ankylosing spondylitis,²⁸⁶ and rheumatoid arthritis.²⁸⁸ Responses were on an 11-point numeric rating scale with anchors at 0 (No fatigue) and 10 (Fatigue as bad as you can imagine). Higher scores on the WF-NRS indicate higher fatigue severity. Fatigue severity was measured in this study as shown below:

Directions: Please circle the one number on the scale that best answers the question.

On average, how much **FATIGUE** have you experienced in the **past week**?

0	1	2	3	4	5	6	7	8	9	10
No fatigue									Fatigue as bad as you can imagine	

4.4.2.3 FUNCTIONING

Functioning was conceptualized as three different measures: body image, depression, and comorbidity. Body image was measured by the Body Image Scale (BIS)²⁸⁹ which was developed in collaboration with the European Organization for Research and Treatment of Cancer (EORTC) Quality of Life Study Group. The BIS is a 10-item scale developed to measure changes in body image in patients with cancer.

Responses range from 0 (not at all) to 3 (very much). BIS scores were calculated by adding the score obtained on each item, yielding a range of possible scores from 0–30. Higher scores indicate a greater degree of body image dissatisfaction. Cronbach’s alpha for the BIS (without the inclusion of item number 10, which is referent to appearance of scar) was 0.89.²⁸⁹

Depression was measured by two items: “Have you been diagnosed (by a professional) with depression?” (“0” for no, and “1” for yes),” and if yes, whether they were currently receiving treatment for depression (“0” for no, and “1” for yes). Comorbidity was assessed by using the Self-Administered Comorbidity Questionnaire (SCQ).²⁹⁰ The SCQ addresses 13 major body systems with three binary question regarding the occurrence of health-related problems (problem score), treatments received or medication (treatment score), and limitations experienced in daily life (limitation score). The sum of all the affirmed items from the three sub-scores make up the total score of the SCQ, ranging from 0 to 39, with higher scores indicating higher comorbidity scores and limitations.²⁹¹ Further, three CLE-relevant additional conditions were added to the SCQ,²⁹⁰ which were rheumatoid arthritis, hepatitis, and HIV. However, *depression* was taken out of the list of comorbidities as this was already being measured as a separate variable. As a result, the scores for the final SCQ measure possibly ranged from 0 to 42, with higher scores representing higher comorbidity.

4.4.2.4 GENERAL HEALTH PERCEPTIONS

General health perceptions were assessed by using measures from the LupusPRO, which focus on impact and satisfaction with treatment. The LupusPRO²⁹² is a 43-item measure that quantifies the effects of systemic lupus erythematosus (SLE) or its treatment on QoL in adults with SLE over the previous four weeks. It is composed of eight HRQoL domains [lupus symptoms (3 items), cognition (2 items), lupus medications (2 items), procreation (2 items), physical health (5 items), pain vitality (5 items), emotional health (6 items), and body image (5 items)] and four non-HRQoL domains [(desires-goals (4 items), social support (2 items), coping (3 items), and satisfaction with care (4 items))]. Items are rated on a 5-point Likert scale from 0 (none of the time) to 4 (all of the time), and a “not applicable” response is included for some questions. Item scores are totaled for each domain item, and the mean domain score is obtained by dividing the total score by the number of items in that domain. The mean raw domain score is transformed to scores ranging from 0 (worst QoL) to 100 (best QoL) by dividing by 4 [the number of Likert responses (5 responses) minus 1] and then multiplying by 100, as below:

$$(\text{Mean raw domain score}/4) \times 100 = \text{Transformed score for the domain.}$$

Total HRQoL and non-HRQoL scores were obtained by averaging the domain scores within each construct.

The LupusPRO was developed based on input from SLE patients in both concept elicitation and cognitive interview phases of research. Evaluation of the psychometric properties of the LupusPRO in SLE patients demonstrates evidence of

acceptable reliability (internal consistency and reproducibility) and construct validity (concurrent and known groups).^{48,292} The ability to detect change (responsiveness and sensitivity to change) was not reported for the LupusPRO.^{48,292} While the measures in the LupusPRO were developed for and in SLE patients, some of the domains are relevant and similar to CLE patients; these are lupus medications, desires-goals, and social support, and these were the only measures from the LupusPRO used in this current study.

Side-effects and medication burden were measured with two items from the LupusPRO, respectively: “In the past 4 weeks, how often did you experience the following due to your CLE: serious side-effects associated with CLE medications, and concerns about the number of medications you currently take for your CLE?” Items were rated on a 5-point Likert scale from 0 (none of the time) to 4 (all of the time) and “not applicable (recoded as ‘0’ for scoring);” each item was then reverse-coded. Domain scores ranged from 0 to 8, with higher scores reflecting lower medication burden, and subsequently lower treatment impact. Finally, skin health perception was measured on an 11-point numeric rating scale with anchors at 0 (Worst skin imaginable, i.e., total body burn) and 10 (Perfect health), with higher scores indicating better perceptions of skin health.

4.4.2.5 CHARACTERISTICS OF THE INDIVIDUAL

Baseline measures used to assess the characteristics of the individual include:

Age

Age was measured by asking respondents in what year were they born. The year provided from participants was subtracted from the current year (2016) to calculate participants' ages.

Gender

Participants were asked to indicate whether they are male ('1') or female ('2').

Education

Participants were asked to indicate their highest educational attainment from the following categories: Lower than High School, High School, College Degree, or Graduate Degree.

Race/ethnicity

This was measured by asking participants to indicate which of the listed categories best describes their race/ethnicity: African American/Black, Asian, Caucasian, Hispanic, or Other. Race/ethnicity was then recoded as African American/Black vs. Others (Asian, Caucasian, Hispanic, or Other).

Smoking Status

Participants were asked if they smoked cigarettes using three categories: Former Smoker, Never smoker, and Current Smoker, which was then recoded into two categories as "1" for current/former smoker and "2" for never smoker).

4.4.2.6 CHARACTERISTICS OF THE ENVIRONMENT

Characteristics of the environment were measured as follows:

Marital status

Marital status was measured as Single, Divorced, Married/Domestic Partner, Widowed, or Separated. This variable was then recoded into two categories as “1 (married/domestic partner)” and “2 (not married)” for single, divorced, widowed, and separated.

Income

Socioeconomic (SES) indices at the ZIP code level were calculated from publicly-available data on annual median household income.²⁹³ The annual median household income served as a proxy for individual-level annual income.

Social Support

Social support was measured by a single item from the LupusPRO: “Generally, I receive support from friends and/or family?” Response scales ranged from 0 (none of the time) to 4 (all of the time); and “not applicable (recoded as ‘0’ for scoring),” with higher scores reflecting higher social support. Table 4.1 below summarizes the sources of construct measurements in this study.

Table 4.1: Sources of Construct Measurement			
CONSTRUCT	OPERATIONAL DEFINITION	DATA SOURCE	ITEMS
CLEQoL	This assessed participants' overall quality of life. The CLEQoL contains 36 items (Item 18 about side-effects of treatment is not scored) and asked participants how often (Never, Rarely, Sometimes, Often, All the time) during the previous four weeks they experienced the effect described in each item. Scores of 0 (never), 25 (rarely), 50 (sometimes), 75 (often), and 100 (all the time) were assigned to each question and averaged to determine each domain score from 0-100. Scores ranged from 0 to 100 with higher scores indicating poorer quality of life.	Focus group findings Chren et al. ²⁹ Lilly et al. ¹⁵⁷	36
Short-Form (SF)-36	Thirty-six items assessed general health and evaluated the following domains over the past four weeks: physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional (RE) and mental health (MH). ⁵⁴ Each score was transformed onto a 0–100 scale and converted into a norm-based score (using a mean of 50 and an SD of 10 for the U.S general populations), with higher scores indicating a higher quality of life.	Ware & Sherbourne ⁵⁴	36
Biological and Physiological Factors	CLE subtype: acute (ACLE), subacute (SCLE), chronic (DLE, Tumid lupus, Lupus panniculitis)	Sonthemier et al. ²⁹⁴	1
	Disease activity and damage: CLASI disease activity and damage scores ranged from 0 to 70 with higher scores equal greater activity and damage, respectively	Albrecht et al. ⁵⁰	-
	Disease duration was measured by reviewing patients' medical records to see how long they have been diagnosed with CLE by subtracting the date of their last clinical visit from the biopsy date.	-	1
Symptom Status	Pain was measured using the pain intensity numeric rating scale (PI-NRS). ²⁸¹ The PI-NRS is a single 11-point numeric scale with 0 representing one pain extreme (e.g., "no pain") and 10 representing the other pain extreme (e.g., "pain as bad as you can imagine"). Higher scores indicated greater pain intensity.	Farrar, Young, LaMoreaux, Werth & Poole ²⁸¹	1
	The Worst Itch Numeric Rating Scale (WI-NRS) ²⁸² was used to assess pruritus/itching. It is a single 11-point numeric scale with 0 representing "no itching" and 10 representing "itch as bad as you can imagine." Higher scores indicated higher itch severity. The scale has a recall period of the last 24 hours.	Naegeli et al. ²⁸²	1
	The Worst Fatigue – Numeric Rating Scale (WF-NRS) ²⁸⁶ was used to assess the severity of fatigue during the previous 24-hour period. Responses are on an 11-point numeric rating scale with anchors at 0 (No fatigue) and 10 (fatigue as bad as you can imagine). Higher scores on the WF-NRS indicated higher fatigue severity.	Naegeli et al. ²⁸²	1
Functioning	Depression: A two-item question asked participants if they have ever been professionally diagnosed with depression ("0" for no and "1" for yes) and if yes, whether they were currently receiving treatment for depression.	-	2

Table 4.1: Sources of Construct Measurement (Cont'd)			
CONSTRUCT	OPERATIONAL DEFINITION	DATA SOURCE	ITEMS
Functioning	Body Image: A 10-item scale that measured changes in body image. Responses ranged from 0 (not at all) to 3 (very much); yielding a possible score ranging from 0 to 30 with higher scores indicating a greater degree of body image dissatisfaction.	Hopwood, Fletcher, Lee, Ghazal. ²⁸⁹	10
	Self-Administered Comorbidity Questionnaire (SCQ): A 14-item scale that measured health-related problems, medications or treatments received, and limitations experienced. The SCQ yielded a possible score ranging from 0 to 42 with higher scores indicating higher scores indicating higher comorbidity.	Sangha et al. ²⁹⁰	14
General Health Perceptions	*Side-effects from CLE medications: This was measured by using one item from the LupusPRO measured on a 5-point Likert response scale ranging from 0 (none of the time) to 4 (all of the time), and “not applicable (recoded as ‘0’ for scoring).” Scores ranged from 0 to 4 and were reverse coded with higher scores reflecting fewer side-effects experienced with CLE medications.	Jolly et al. ²⁹²	1
	*Pill Burden: This was assessed by a single measure from the Lupus PRO. Responses were rated on a 5-point Likert scale from 0 (none of the time) to 4 (all of the time); and “not applicable.” Scores ranged from 0 to 4 and were reverse coded with higher scores reflecting lower pill burden.	Jolly et al. ²⁹²	1
	Skin health perception: This was measured using a single item numeric scale to assess patients’ current perception of their skin health. Responses were on an 11-point numeric rating scale with anchors at 0 (worst skin imaginable, i.e., total burden) to 10 (perfect health). Higher scores on this scale indicated better skin health perceptions.	Electronic medical record review (EMR)	1
Characteristics of the Individual	These are baseline measures that may or may not directly/indirectly influence the QoL of CLE patients: <ul style="list-style-type: none"> - Age of participants (in years) - Gender (male, female) - Education (lower than high school, high school, college, or graduate degree) - Race/ethnicity (African American/Black, Asian, Caucasian, Hispanic, or Other) - Smoking Status (former smoker, current smoker, and never smoker) 	EMR	All single-item measures
Characteristics of the Environment	These are factors that are assumed to include tangible and intangible resources available in the individual’s surroundings: ²²³		All single-item measures
	- Marital status (single, divorced, married/domestic partner, widowed, or separated)	EMR	
	- Income	EMR	
	- Social Support (none of the time, a little of the time, some of the time, most of the time, all of the time).	Jolly et al. ²⁹²	

*Item was reverse-coded

4.5 SURVEY PRETEST

After the FG transcripts were content-analyzed and the instrument was created, the questionnaires were pretested by patients and physicians to ensure content validity and readability of all questions and responses. Participants were asked to give feedback on potential issues with format/layout, length, unclear or confusing questions, unclear or confusing answer choices, instructions, relevance, and face validity.²⁹⁵ Once the feedback was received, necessary changes were made to improve the questionnaire before being administered to the final, target population.

4.6 INSTRUMENT DISTRIBUTION

CLE is a chronic, rare disease with a prevalence rate of 30 - 41 cases per 100,000 persons. To this end, registries are the best sources of identifying patients as they serve as a large repository of patient information such as diagnosis, age, gender, and medications. The University of Texas (UT) Southwestern Medical Center and Parkland Health and Hospital System maintain a large registry database for CLE patients and served as the sites for patient recruitment. In addition, patients who were not in the registry were recruited during their clinical visit to the hospital.

Each survey packet contained a cover letter [See Appendix H], detailing the purpose of the study and the importance of respondents' participation. Patient recruitment occurred began in April 2016 and ended in October 2016.

Data Collection

Using the paper-pencil surveys [See Appendix I], participants were recruited during their clinical visits to the hospital. Clinical staff from both hospitals in Dallas assisted in recruiting patients during their clinic visits. These patients were asked if they would be interested in participating in a study about CLE and how it affects them. If the patient agreed and met our eligibility criteria, he/she was handed a copy of the questionnaire. Completed surveys were handed to the clinic personnel and kept in folders provided to them.

4.7 DATA ANALYSES

Data from the final survey were coded and analyzed using SPSS version 23. The significance level for this study was set *a priori* as 0.05.

Descriptive Statistics

Each continuous/interval variable was examined for its distribution, range, mode, median, mean, and standard deviation. Normality tests, skewness, and kurtosis were carried out on continuous and interval-level variables. All interval-level data (dependent variables only) were screened to ensure that the normality assumptions were met before applying statistical tests.

For dichotomous and nominal-level variables, frequencies were assessed to determine if the requirements for cell sizes are met. Finally, data were screened for missing values and outliers.

Inferential Statistics

Independent samples *t*-tests (for explanatory variables with two levels) and ANOVA (for explanatory variables with more than two levels) were conducted on study variables.

Multiple Regression Analyses

The statistical objectives of this current study were to develop two regression models to predict overall QoL (assessed using CLEQoL and SF-36) in patients with CLE using biological and physiological factors (CLE subtype, disease activity, disease damage, disease duration), symptom status, (pain, pruritus, fatigue), functioning (body image, depression, comorbidity), and general health perceptions (side-effects from CLE medications, skin health perception, pill burden), as main predictor variables. Characteristics of the individual (age, gender, education, race/ethnicity, and smoking status) and the environment (marital status, income, and social support) served as the covariates of the study.

Due to the small sample size, the study objectives (from Chapter 3) were revised to include only the predictor variables that were empirically important and strongly related to the dependent variables. To achieve this, parsimonious models were built by first running bivariate analyses to determine which independent variables and covariates were significant and should be included in the final multivariate regression model. As a result, the predictor variables in the hypothesis/objectives and multiple regression models were reduced from 21 to nine. The reduced model is below in Figure 4.2.

Multiple linear regressions were used to assess: 1) the relationships between the four main determinants (biological and physiological factors, symptom status, functioning, and general health perceptions), and intrinsic (characteristics of the individual) and extrinsic (characteristics of the environment) factors as predictor variables with overall QoL serving as the dependent variable. Each construct was entered into the model simultaneously:

$$Y_1 = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + B_9X_9e_i$$

$$Y_2 = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + B_9X_9e_i$$

Y_1 = overall quality of life as measured by the CLEQoL

Y_2 = overall quality of life as measured by the SF-36

B_0 = intercept

X_1 = disease activity

X_2 = pain

X_3 = pruritus

X_4 = fatigue

X_5 = body image

X_6 = side-effects from CLE medications

X_7 = race/ethnicity

X_8 = smoking status

X_9 = social support

e_i = error term

The Bs are the regression coefficients for the respective predictor variables. The dependent variables in the regression equations are Y_1 and Y_2 .

Tests for multivariate normality, linearity, and homoscedasticity were carried out on relevant variables by examining standardized residual scatterplots.²⁹⁶ Normality is met when all variables and possible linear combinations of variable are distributed normally. If met, the differences between the observed and predicted values (residual) are distributed proportionately across the center of the scatterplot. Normality was examined via statistical or graphical analyses; by using skewness and kurtosis. Skewness implies that the shape of a unimodal distribution is asymmetrical about its mean.²⁹⁷ Kurtosis is a measure of the ‘peakedness’ of the distribution.²⁹⁸ In this study, normality was assessed with histograms, residual scatterplots, and probability plots. Also, values of $> |2|$ for skewness and $> |7|$ for kurtosis would be problematic for multivariate data.²⁹⁹

Pearson’s correlation assumes that variables are linearly related to one another. Thus, linearity and homoscedasticity (uniform distributions) assumptions were assessed by visually inspecting the coordinate pairs of data points of two continuous variables via data plotted in a scatterplot.^{297,300} Violating any of these assumptions may not necessarily compromise data analysis but rather weakens it. In the event of violation, data can be transformed.²⁹⁶

Multicollinearity is another potential problem that could be seen in multivariate modeling. This occurs when two predictor variable are highly correlated with one another. The presence of multicollinearity can inflate the standard deviation of regression weights and decrease statistical power. Multicollinearity can be detected when tolerance is < 0.1 or variance inflation factor (inverse of tolerance) is > 10 .²⁹⁶ If

multicollinearity exists between predictor variables, only one variable will be included in the final regression model.

Reliability and Validity

Reliability was assessed using an index of internal consistency (e.g., Cronbach's alpha).^{301,302} The reliability of multi-item scales (CLEQoL, SF-36, and Body Image) was assessed via Cronbach's alpha, where an acceptable value of internal consistency was $\alpha \geq 0.60$.³⁰³ Construct validity was assessed using exploratory factor analysis to determine the number of factors (or subscales) within the construct. The Kaiser–Meyer–Olkin (KMO) test (where a value of ≥ 0.80 indicates adequate data fit) and the Bartlett's test of sphericity were used to check the appropriateness of the study sample and the factor analysis model.^{304,305} The number of factors was determined based on eigenvalues and scree plot. Items with absolute loading values of 0.3 or greater were regarded as appropriate (eigenvalues of one or less should be ignored).³⁰⁶

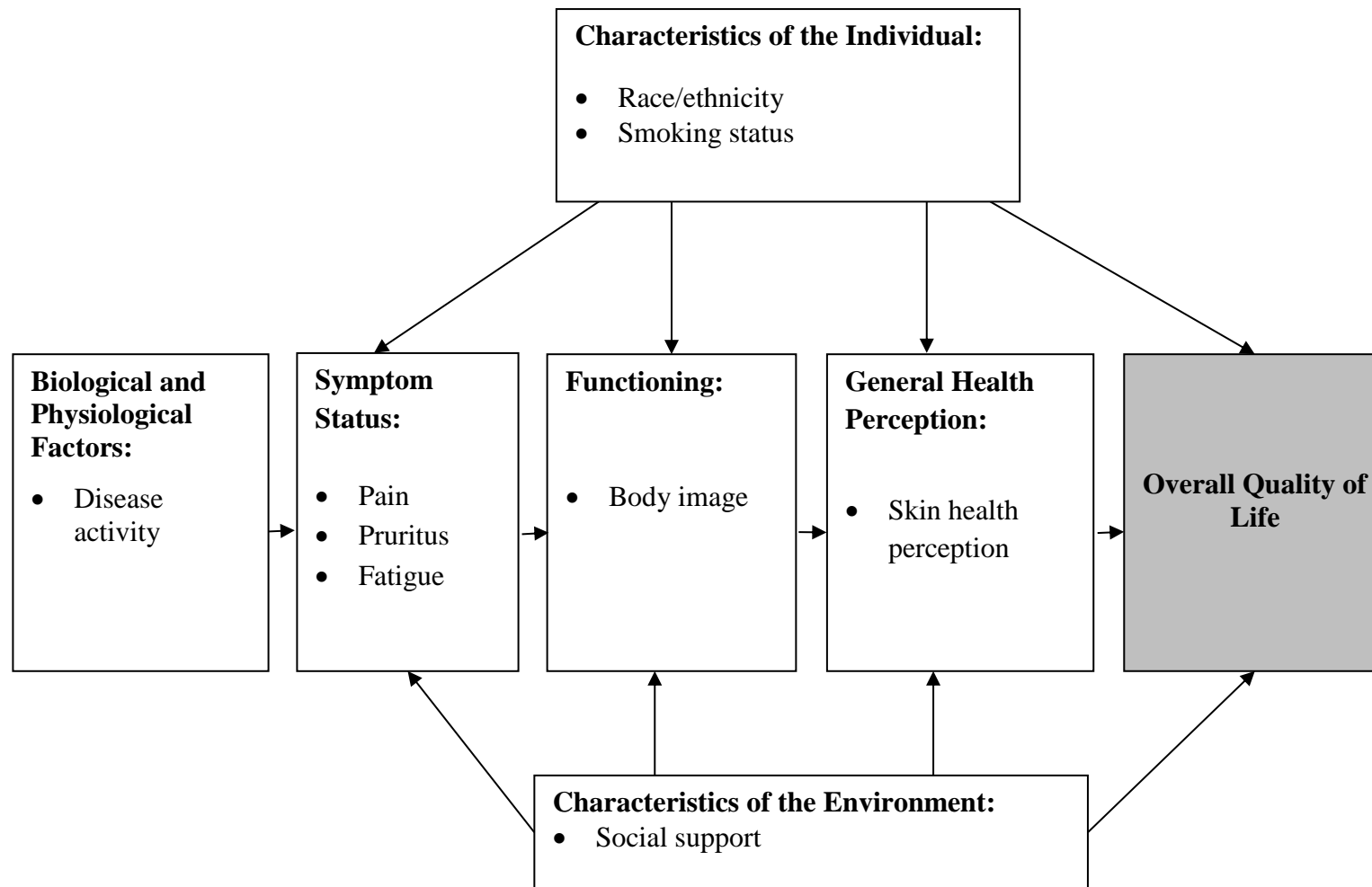


Figure 4.2: The reduced Revised Wilson and Cleary model listing the variables tested at each conceptual level

4.7.1 SAMPLE SIZE DETERMINATION

To ensure adequate power to decrease the probability of accepting an incorrect null hypothesis, sample size estimations should be performed a priori.³⁰⁷ This is also important in ensuring that the statistical analyses to be conducted will be capable of supporting the stated hypotheses under investigation.³⁰⁸ In estimating appropriate sample sizes, estimates of effect size from past studies using the Wilson and Cleary Model (multiple R ranging from 0.39 to 0.53; i.e., R^2 of 39.2% - 53%),^{205,235,309,310} a significance level of 0.05, 80 percent power, and nine predictor variables were used. The power analysis was conducted using *GPower* software, and the estimated sample was calculated as a range from 39 - 50 subjects.³¹¹ Accordingly, the current sample of size of 57 patients is adequate to power the study.

4.8 HYPOTHESES STATISTICAL TESTS

The theoretical framework of the Revised Wilson and Cleary Model of Patient Outcomes^{3,223} served as the framework for this study. Use of this framework guided the research in terms of: 1) identifying the relevant measurement variables for CLE, and 2) identifying potential links among the variables within the complex construct of quality of life.²²³ Tables 4.2 – 4.3 provide an outline of the revised objectives, hypotheses, and corresponding statistical tests used in the study.

Table 4.2: Description of Measurement Level and Statistical Test of Study Variables		
Variables	Measurement Level	Statistical Procedure
<u>Dependent Variable</u>		
CLEQoL* [†]	Interval	<u>Descriptive Statistics</u> <ul style="list-style-type: none">Means, SDs, median, mode, skewness, and kurtosis for continuous/interval variablesFrequencies for ordinal and nominal variables*Coefficient alpha (multi-item scales)[†]Exploratory factor analysis
SF-36*	Interval	
<u>Explanatory Variables</u>		
<i>Biological/Physiological Factors</i>		
CLE subtype	Nominal	
Disease activity	Interval	
Disease damage	Interval	
Disease duration	Interval	
<i>Symptom Status</i>		
Pain	Interval	
Pruritus	Interval	
Fatigue	Interval	
<i>Functioning</i>		
Body image*	Interval	
Depression	Nominal	
Comorbidity*	Interval	
<i>General Health Perceptions</i>		
Side-effects from CLE medications	Interval	
Skin health perception	Interval	
Pill burden	Interval	
<i>Characteristics of the Individual</i>		
Age	Interval	
Gender	Nominal	
Education	Ordinal	
Race/ethnicity	Nominal	
Smoking status	Nominal	
<i>Characteristics of the Environment</i>		
Marital status	Nominal	
Income	Interval	
Social support	Interval	

Table 4.3: Study Objectives, Hypotheses and Corresponding Statistical Tests			
Objectives/Hypotheses	Dependent Variable	Independent Variable	Statistical Test
Objective 1: To describe participants' biological and physiological factors (CLE subtype, disease activity, disease damage, and disease duration), symptom status, (pain, pruritus, and fatigue), functioning (body image, depression, and comorbidity), general health perceptions (side-effects from CLE medications, skin health perception, and pill burden), characteristics of the individual (age, gender, education, race/ethnicity, and smoking status), characteristics of the environment (marital status, income, and social support), and overall quality of life (CLEQoL and SF-36).			
Objective 2: To determine the predictive ability of biological and physiological factors (disease activity), symptom status (pain, pruritus, or fatigue), functioning (body image), general health perception (skin health perception) in explaining overall quality of life (QoL) in patients with CLE while controlling for characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).			
H_{2A}: Biological and physiological factors (disease activity), symptom status (pain, pruritus, or fatigue), functioning (body image), general health perception (skin health perception) will explain a significant amount of variance in overall QoL (CLEQoL and SF-36) while controlling for characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).	Overall QoL (CLEQoL and SF-36)	<u>Primary variables</u> <ul style="list-style-type: none"> • Biological and physiological factors (disease activity) • Symptom status (pain, pruritus, fatigue) • Functioning (body image) • General health perception (skin health perception) <u>Covariates</u> <ul style="list-style-type: none"> • Characteristics of the individual (race/ethnicity, smoking status) • Characteristics of the environment (social support) 	Multiple regression; R ² , F-test
H_{2B1}: Biological and physiological factor (disease activity) will be a <i>positive</i> and significant predictor of overall QoL (CLEQoL) while controlling for symptom status (pain, pruritus, or fatigue), functioning (body image), general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).			
H_{2B2}: Biological and physiological factor (disease activity) will be a <i>negative</i> and significant predictor of overall QoL (SF-36) while controlling for symptom status (pain, pruritus, or fatigue), functioning (body image), general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).			

Table 4.3: Study Objectives, Hypotheses and Corresponding Statistical Tests (Cont'd)			
Objectives/Hypotheses	Dependent Variable	Independent Variable	Statistical Test
<p>H_{2C1}: Symptom status (pain, pruritus, or fatigue), will be a <i>positive</i> and significant predictor of overall QoL (CLEQoL) while controlling for biological and physiological factors (disease activity), functioning (body image) general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).</p> <p>H_{2C2}: Symptom status (pain, pruritus, or fatigue), will be a <i>negative</i> and significant predictors of overall QoL (SF-36) while controlling for biological and physiological factors (disease activity), functioning (body image), general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).</p> <p>H_{2D1}: Functioning (body image) will be a <i>positive</i> and significant predictor of overall QoL (CLEQoL) while controlling for biological and physiological factors (disease activity), symptom status (pain, pruritus, or fatigue), general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).</p> <p>H_{2D2}: Functioning (body image) will be a <i>negative</i> and significant predictor of overall QoL (SF-36) while controlling for biological and physiological factors (disease activity), symptom status (pain, pruritus, or fatigue), general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).</p>	Overall QoL (CLEQoL and SF-36)	<p>Primary variables</p> <ul style="list-style-type: none"> • Biological and physiological factors (disease activity) • Symptom status (pain, pruritus, fatigue) • Functioning (body image) • General health perception (skin health perception) <p>Covariates</p> <ul style="list-style-type: none"> • Characteristics of the individual (race/ethnicity, smoking status) • Characteristics of the environment (social support) 	Multiple regression; R ² , F-test

Table 4.3: Study Objectives, Hypotheses and Corresponding Statistical Tests (Cont'd)			
Objectives/Hypotheses	Dependent Variable	Independent Variable	Statistical Test
<p>H_{2E1}: General health perception (skin health perception) will be a <i>positive</i> and significant predictors of overall QoL (CLEQoL) while controlling for biological and physiological factors (disease damage), symptom status (pain, pruritus, or fatigue), functioning (body image), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).</p> <p>H_{2E2}: General health perception (skin health perception) will be a <i>negative</i> and significant predictors of overall QoL (SF-36) while controlling for biological and physiological factors (disease damage), symptom status (pain, pruritus, or fatigue), functioning (body image), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).</p>	Overall QoL (CLEQoL and SF-36)	<p>Primary variables</p> <ul style="list-style-type: none"> • Biological and physiological factors (disease activity) • Symptom status (pain, pruritus, fatigue) • Functioning (body image) • General health perception (skin health perception) <p>Covariates</p> <ul style="list-style-type: none"> • Characteristics of the individual (race/ethnicity, smoking status) • Characteristics of the environment (social support) 	Multiple regression; R ² , F-test
Objective 3: To determine if symptom status (pain, pruritus, or fatigue) is related to biological and physiological factors (disease activity), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).			
H_{3A1}: There is no association between biological and physiological factors (disease activity) and symptom status (pain).	Symptom status (pain)	Biological/ physiological factors (disease activity)	Correlation
H_{3A2}: There is no association between biological and physiological factors (disease activity) and symptom status (pruritus).	Symptom status (pruritus)		
H_{3A3}: There is no association between biological and physiological factors (disease activity) and symptom status (fatigue).	Symptom status (fatigue)		

Table 4.3: Study Objectives, Hypotheses and Corresponding Statistical Tests (Cont'd)			
Objectives/Hypotheses	Dependent Variable	Independent Variable	Statistical Test
H _{3B1} : There is no association between characteristics of the individual (race/ethnicity, smoking status) and symptom status (pain).	Symptom status (pain)	Characteristics of the individual (race/ethnicity, smoking status)	T-test
H _{3B2} : There is no association between characteristics of the individual (race/ethnicity, smoking status) and symptom status (pruritus).	Symptom status (pruritus)		
H _{3B3} : There is no association between characteristics of the individual (race/ethnicity, smoking status) and symptom status (fatigue).	Symptom status (fatigue)		
H _{3C1} : There is no association between characteristics of the environment (social support) and symptom status (pain).	Symptom status (pain)	Characteristics of the environment (social support)	Correlation
H _{3C2} : There is no association between characteristics of the environment (social support) and symptom status (pruritus).	Symptom status (pruritus)		
H _{3C3} : There is no association between characteristics of the environment (social support) and symptom status (fatigue).	Symptom status (fatigue)		
Objective 4: To determine if functioning (body image) is related to symptom status (pain, pruritus, or fatigue), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).			
Objectives/Hypotheses	Dependent Variable	Independent Variable	Statistical Test
H _{4A1} : There is no association between symptom status (pain) and functioning (body image).	Functioning (body image)	Symptom status (pain)	Multiple regression; R ² , F-test
H _{4A2} : There is no association between symptom status (pruritus) and functioning (body image).		Symptom status (pruritus)	
H _{4A3} : There is no association between symptom status (fatigue) and functioning (body image).		Symptom status (fatigue)	
H _{4B1} : There is no association between characteristics of the individual (race/ethnicity) and functioning (body image).		Characteristics of the individual (race/ethnicity)	
H _{4B2} : There is no association between characteristics of the individual (smoking status) and functioning (body image).		Characteristics of the individual (smoking status)	
H _{4C} : There is no association between characteristics of the environment (social support) and functioning (body image).		Characteristics of the environment (social support)	

Table 4.3: Study Objectives, Hypotheses and Corresponding Statistical Tests (Cont'd)			
Objectives/Hypotheses	Dependent Variable	Independent Variable	Statistical Test
Objective 5: To determine if general health perception (skin health perception) is related to functioning (body image), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).			
H_{5A}: There is no association between functioning (body image) and general health perception (skin health perception).	General health perception (skin health perception)	Functioning (body image)	Multiple regression; R ² , F-test
H_{5B1}: There is no association between characteristics of the individual (race/ethnicity) and general health perception (skin health perception).		Characteristics of the individual (race/ethnicity)	
H_{5B2}: There is no association between characteristics of the individual (smoking status) and general health perception (skin health perception).		Characteristics of the individual (smoking status)	
H_{5C}: There is no association between characteristics of the environment (social support) and general health perception (skin health perception).		Characteristics of the environment (social support)	
Objective 6: To compare the predictive ability of each of the two models (Model 1 – CLEQoL and Model 2 – SF-36), in patients with CLE according to the proposed theoretical framework of the Revised Wilson and Cleary Model.			
Hypothesis		Statistical Test	
H_{6A}: The model with CLEQoL (Model 1) as the dependent variable will have a higher predictive ability than the model with SF-36 (Model 2), using the Williams's <i>t</i> -tests.		Williams's ³¹² test of comparing two nonindependent correlation with a variable in common.	

4.9 LIMITATIONS

Several limitations are to be noted in this study. The limitations are categorized as 1) methodological and 2) statistical.

4.9.1 METHODOLOGICAL LIMITATIONS

The data analyses were based on cross-sectional data. This limitation would be of paramount concern if the purpose of the research were to explicitly assert causality in the sense that a change in, for example, symptom status in a particular CLE patient would lead to a corresponding change in functioning in that same patient. However, this was not the purpose of the study. Rather, the study purpose was to examine the relationships among the explanatory variables and overall QoL. Another limitation is that the sampling frame includes CLE patients located at specific clinics in North Texas. Thus, the results may not be generalizable to other CLE patients beyond the selected population. Further, the measures employed in the final questionnaire to identify factors that affect QoL in CLE patients may not account for all the relevant factors important and related to their QoL. Also, disease activity and damage have been reported to fluctuate over time, and this limitation may be more pronounced in instances where recent assessments were not available and past assessments in patient charts were used.³¹³

4.9.2 STATISTICAL LIMITATIONS

One of the limitations was the small sample size which was accounted for by building parsimonious models. This study examined unidirectional relationships in the Revised Wilson and Cleary model;³ Ferrans et al., suggests assessing the relationships among the variables in a bi-directional fashion. Finally, the use of multiple regression only allows for examining direct effects among variables and as such indirect effects, which may be relevant in this conceptual model, could not be assessed.

Even though our multiple regression generates a directional model, it is unable to test causal relationships between the variables when used in cross-sectional studies. It is also not feasible to verify whether the variables of interest in the model follow one another chronologically unless data are collected prospectively.²⁴⁶

4.10 SUMMARY

This chapter outlined the methodological plans for this study. It also described the procedures that were used to develop the measures in the survey. The study variables, objectives, and hypotheses tested, as well as the statistical tests used in determining statistical significance were outlined in this chapter.

CHAPTER FIVE: RESULTS

This chapter presents the main findings of the study. The Revised Wilson and Cleary Model served as the theoretical framework for the study. The findings from the focus group sessions are first explained. Next, the results from the exploratory factor analysis and internal consistency of multi-item scales are presented. Then, the paper-pencil surveys administered to patients with CLE are described. Descriptive statistics are presented for all study variables along with bivariate statistics for all theoretical constructs. Inferential statistics such as ANOVAs, t-tests, and multivariate regression analyses were used to examine the relationships among the variables with the study model.

5.1 FOCUS GROUP RESULTS

Table 5.1 provides an overview of participants' demographic and disease characteristics. A total of 19 patients participated in three FGs, with an average age of 49 ± 14 years (range: 25-74 years) and an average age at diagnosis of 31 ± 10 years (range: 10 – 51 years). Most participants were female (94.7%), African-American (68.4%), not Hispanic/Latino (89.5%), and had chronic CLE (73.7%). Most participants resided in urban areas (52.6%) and were mostly single, not in a relationship (31.6%) or married (31.6%). Participants mostly had a college degree (47.4%), perceived their health to be fair or good (47.4%), and had private insurance (47.4%). Finally, more than half of the participants were never smokers (63.2%).

Table 5.1 Patient Demographic and Disease Characteristics (N=19)

Characteristics	Frequency (%)	Mean±SD
Age (yrs.)		49±14
Age at diagnosis (yrs.)		31±10
Gender		
Female	18 (94.7)	
Male	1 (5.3)	
Race		
African-American	13 (68.4)	
Caucasian	6 (31.6)	
Ethnicity		
Not Hispanic/Latino	17 (89.5)	
Puerto Rican	1 (5.3)	
Mexican-American	1 (5.3)	
Geographic Residence		
Urban	10 (52.6)	
Suburban	6 (31.6)	
Rural	3 (15.8)	
Marital Status		
Married	6 (31.6)	
Single, not in a relationship	6 (31.6)	
Single, in a relationship	4 (21.1)	
Divorced/separated	2 (10.5)	
Partner/living together	1 (5.3)	
Education		
Less than High School/GED	7 (36.8)	
College Degree	9 (47.4)	
Postgraduate	3 (15.8)	
Health Insurance		
Private Insurance (e.g., BlueCross/Blue Shield)	9 (47.4)	
Public Insurance (e.g., Medicaid, Medicare)	7 (36.8)	
None/Self-pay	3 (15.8)	
Smoking Status		
Never Smoker	12 (63.2)	
Current Smoker	4 (21.1)	
Predominant CLE Subtype		
Chronic	14 (73.7)	
Subacute	3 (15.8)	
Acute	2 (10.5)	
Perception of Health		
Fair	9 (47.4)	
Good	9 (47.4)	
Excellent	1 (5.3)	

Saturation was reached after the third FG. Four themes emerged from the FGs and captured the perceptions of patients regarding CLE and how it impacts their lives. Themes, sub-themes, and sample quotes are contained in Table 5.2 and summarized below.

5.1.1 Theme 1: Disease Sequelae of Cutaneous Lupus Erythematosus (CLE)

Three subthemes derived from this theme were physical, mental, and medication effects.

5.1.1.1 Physical effects

Signs and symptoms ranged from pruritus, photosensitivity, and scarring which affected patients with CLE on a variety of levels. Itching was problematic when not controlled by medication, and was especially frustrating when they are instructed not to scratch. One patient noted, *“Everything itches on me, I take all of my clothes off and take a shower.”* Increased sensitivity to sunlight, touch, heat, and cold were commonly reported by participants. Photosensitivity often limited outdoor participations, especially in the summer. Most female patients reported summertime as the most difficult season of the year since they could no longer wear bathing suits or engage in outdoor activities due to their photosensitivity, discoloration, and scars. Also, several patients experience permanent and visible skin lesions such as scarring and dyspigmentation which often led to embarrassment. Overall, patients were often more distressed by what others thought of their physical appearance than from the physical manifestations of the

disease. Thus, many patients resorted to the use of cover-ups like wigs, hats, or sunglasses. Moreover, younger patients in our study expressed poorer self-image and compared their appearance to those of their peers. As patients grew older, they cared less about what others thought about their visible lesions. This sentiment was exhibited through this comment:

“I used to care more when I was younger and about what they thought. Now, I am more like, this is me if you care or not.”

5.1.1.2 Mental Effects

Self-reported depression, insomnia, and anxiety were core concerns of patients that bordered on mental health. Patients who reported being depressed talked about having suicidal attempts (or thoughts), mood swings, and not wanting to be around people anymore. For example, one patient said, *“My confidence was so worn down that I stopped going out with friends because I might be somewhere and all of the sudden I don’t feel well. I have learned to navigate that through the years, but it has definitely affected me socially.”*

Many patients complained of severe sleep disturbance, ranging from problems initiating sleep, to maintaining, and having restful sleep. It is uncertain whether these issues were related to medical side effects or anxiety as sequelae from their CLE. Also, patients with female progenies worried regularly about the possibility of passing CLE down. In the words of one patient: *“My baby is 25, and I worry about that every day. My son, he doesn’t have it yet, but my brother does.”*

5.1.1.3 Medication Effects

Patients raised several concerns regarding the toxicities and number of medications they were using. One female patient expressed regret as to giving up her plans to have more kids because of the teratogenic effects of thalidomide. Most patients reported taking an excessive number of pills to manage their disease. In addition, some patients feared that more pills could be added to their current regimen as the disease progresses. Also, not having many treatment options was another issue echoed by participants. Thus, patients expressed the need for more drugs to be developed for CLE. One patient displayed her frustration by saying, *“It’s like since I was diagnosed 30 years ago, and there has been no difference in the treatment. I am still using the same medications as I did many years ago. I wished there were different treatment options.”*

5.1.2 Theme 2: Effects on Social Interaction from CLE

5.1.2.1 Social Anxiety

Patients not only found it hard to interact with others but were often worried that they would be a burden to others. As a result, this affected their relationships with other people, especially romantically. One patient noted, *“I was married one time and it kind of messed up my relationship with my husband because he felt like I was always tired or I will always complain about my face or something.”* Other patients also reported how their friendship circle was thinning out. This was described as: *“I had to separate myself from my friends; at first, they kinda judge you. They are like ‘Oh, you are sick again’.*

What do you mean sick again? I have been sick. They don't really understand what you are going through."

5.1.2.2 Public Misconceptions and Education

Patients also indicated how they have been either labeled as illicit drug users (due to excessive use of cover-up clothing), victims of domestic violence (due to visible skin discoloration), or contagious (due to active lesions). One patient explained,

"I used to be a manager and I have rashes on my hand. People will look at me funny like they were disgusted to take money for me."

Patients expressed the need for a proper way to educate the public about CLE. Particularly, patients yearned for more compassion and understanding from the public and hoped that CLE would receive the same recognition other diseases like HIV/AIDS and cancer.

5.1.2.3 Seriousness and Unpredictable Nature of CLE

Because of CLE's unpredictable nature, most patients, especially younger ones frequently reported being unable to make long-term career goals due to their uncertainty over timing and frequency of disease flares. As a result, they had to give up their jobs which in turn, led to increased worrying and anxiety. Even on a daily basis, patients reported how sudden flares can render them unable to perform menial tasks. This, in turn, increases the patient's dependence on others for assistance.

"I think it is very difficult for people to understand because of the ups and downs. A lot of times you are feeling good, and they don't understand the quick

changes. Again, I am a mother. With my kids, a lot of times I don't feel like doing anything with them because of my lack of energy. It is very hard for me."

5.1.3 Theme 3: Coping Mechanisms on Living with CLE

5.1.3.1 Positive Strategies

Most patients with CLE reported strategies used to cope with the disease. Positive coping strategies include relying on family members, friends, and loved ones for support, as well as the reliance on faith to help them through tough times. One patient explained, *"My faith helps me cope; praying, and just reading the Bible."*

5.1.3.2 Distracting/Negative Strategies

On the other hand, patients also engaged in avoidance techniques to distract themselves from the harsh realities of having CLE, either by burying themselves with work or using recreational drugs.

"I stay high (on recreational drugs). I am not going to lie. I do."

Several patients had developed resilience to the disease and found their 'new normal.' Also, older patients appeared to have a better understanding of the disease course due to their greater experience at handling different challenges.

5.1.4 Theme 4: Unmet Needs

Several subthemes, which were either symptom, treatment-related or social, were generated when patients were asked about their perceptions of unmet needs

regarding their treatment and care. For the symptoms and treatment-related needs, patients strongly expressed desires for disease-modifying therapies that can either reduce the signs and symptoms (e.g. scarring, discoloration, alopecia) associated with CLE or reduce the number of pills they currently take. Alternatively, for social needs, patients recommended a starter kit to navigate coping with CLE especially when newly diagnosed. Many patients talked about how it was often difficult to figure out the practical steps to take to deal with CLE, such as grooming tips to conceal visible skin lesions. One patient referred to breast cancer as an example:

“They have that for cancer patients. My Godmother is a breast cancer survivor, and I went to a seminar. They gave them this little bag that had all these makeup kits.

Table 5.2: Major Themes and Subthemes by Participants		
Major Themes	Subthemes	Sample Quotes
Disease Sequelae of Cutaneous Lupus Erythematosus (CLE)	Physical effects	<ul style="list-style-type: none"> - “It itches, but you’re told not to scratch it - it’s best just to try and rub it, you know?” - “For me, I am not totally vain but I think that’s just the main thing for me. When I was younger, I had pretty really thick hair which I used to wear short and got a lot of compliments for. I also had a great hair stylist. When I started losing it to the point when it was scarring and it didn’t come back it got to a point, it’s different. I get tired of the weaves and the wigs. There’s no way I can just go natural even because I have so much scarring.”
	Mental effects	<ul style="list-style-type: none"> - “I spent a month at <i>a mental hospital</i>* for suicide attempt and that was my 8th attempt. I don’t remember...I don’t remember if I’d struggled with depression before I was diagnosed with lupus. - “I know that I don’t know where the mood swings come from but it could be there. I don’t know where the depression comes from but it could be there. It may not have anything to do with any of this be it systemically or the outer. It’s just what it is.”
	Medication effects	<ul style="list-style-type: none"> - “I take methotrexate for my skin, I mean I don’t like it because it is a chemotherapy drug and it is hard on your liver, but I want quality of life. If my life is shortened because of all these stuff I have been taking since I was 19. I still take prednisone. I have had to accept it. I need to find a way to enjoy life.” - “That is why I don’t take my meds a lot. I feel like it be messing me up more than it is helping me. You know, once I read those side effects it is downhill for me because I am not about to take it. I am already bald.”
Disease Effects on Interaction with Others	Social anxiety	<ul style="list-style-type: none"> - “CLE makes me not wanting to get around people. I feel like being alone.” - “And so I’ve been told sometimes that I use lupus as a crutch or an excuse to behave a certain way. There are days when you just don’t want to interact. I know that I don’t know where the mood swings come from but it could be there.”
	Public misconceptions and education	<ul style="list-style-type: none"> - “I went to 7-Eleven and someone said ‘what man did you like that?’ I jumped up and left home right quick. I didn’t think about putting my makeup on. I look at it like this; it’s some ignorant people in the world. And instead of staring at me like a child, ask me what’s wrong, ‘cause I have a bad mouth.” - “I just don’t know how to explain it to people. You know, I have a really good friend, she knows I have lupus and that is all she knows. She doesn’t know what it is. How do you explain it to people? Like I don’t just feel like it today?”
	Seriousness and unpredictable nature of the disease	<ul style="list-style-type: none"> - “I think it is very difficult for people to understand because of the ups and downs. A lot of times you are feeling good, and they don’t understand the quick changes. Again, I am a mother. With my kids, a lot of times I don’t feel like doing anything with them because of my lack of energy. It is very hard for me.” “Like she said, it is very depressing. One week you may have a good week and think you are cute and stuff then the next week comes and your face is all jacked up and stuff. It is an up and down thing.”

Table 5.2: Major Themes and Subthemes by Participants (Cont'd)		
Coping Mechanisms	Positive strategies	<ul style="list-style-type: none"> - “My faith helps me cope; praying, and just reading the bible.” - “Spending time with my kids. My kids make me want to be around because I want to live for them.”
	Distracting/negative strategies	<ul style="list-style-type: none"> - “I stay high (on recreational drugs). I am not going to lie. I do.” - “I don’t want to think about it (lupus). I just stay busy.”
Unmet Needs	Symptoms-related	<ul style="list-style-type: none"> - “Something to reduce scarring, the damage caused by the disease. I have it a lot on my back and stomach. I have scars everywhere on my body and back. I know there’s stuff out there but it is expensive.” - The discoloration, can we all just clear them all together so no one has to go through this, okay?” - “It (hair) should come back. A success for me will be measured by my hair growing back.”
	Treatment-related	<ul style="list-style-type: none"> - “I would have to see a reduced number of flares and an improvement in my lab work. This is important to me because I spend way too much time in the hospital. A 60% reduction in hospitalization would be a success for me.” - “I take over 23 medications a day, uh uh, too many!” - “I think something for mental and emotional balance is very important because I know that that has helped me.”
	Support system	<ul style="list-style-type: none"> - “There are no group of people that can help you with how you can blend and cover scars, or what to use to cover my hair. There’s no one, you have to go out there to figure out to so much by yourself. There’s no support.” - “They have that for cancer patients. My godmother is a breast cancer survivor and I went to a seminar. They gave them this little bag that had all these makeup and kit.”

*Name concealed to protect patient’s privacy and confidentiality

5.2 QUESTIONNAIRE PRETEST

Based on the FG data, the final questionnaire was constructed. Ten patients and four physicians/clinical staff pre-tested the survey instrument before dissemination so as to ensure content relevance and readability. Pretesters were given instructions to provide feedback on the following: format/layout, length, instructions, unclear or confusing questions, unclear or confusing answer choices, relevance, and face validity.²⁹⁵ Based on the feedback provided by the pretesters, changes were made to the questionnaires before being administered to the final, target population. Most of the changes made were to the wording of the questions added to the original Skindex-29+3 to make them more consistent.

5.3 SURVEY DISTRIBUTION

Data collection using paper-pencil surveys began in April 2016 and ended in October 2016. The survey packet contained a consent form detailing the purpose of the study as well as the potential risks and benefits.

A total of 64 surveys were received. Seven surveys were deleted and excluded from analysis due to the following reasons: four were from patients with psoriasis, and three were deleted due to incompleteness (i.e., did not answer a sufficient amount of questions on the survey items). Thus, the number of useable surveys was 57. Table 5.3 shows all the primary constructs and representative questions used in the survey.

Table 5.3: Primary Constructs and Representative Survey Questions

Primary Constructs	Number of Items	Questionnaire Number
Overall QoL – SF-36	36	1-11
Overall QoL – CLEQoL*	36	12a-12kk
Pain	1	13
Pruritus/Itch	1	14
Fatigue	1	15
Body image	10	16a-16j
Depression	1	17-18
Comorbidity	15	19a-19o
Side-effects from CLE medications	1	20a
Pill burden	1	20b
Skin health perception	1	21
Age	1	22
Gender	1	23
Education	1	24
Race/ethnicity	1	25
Smoking status	1	26
Marital status	1	27
Income	1	28
Social support	1	29

* Represents items developed from focus group findings and feedback from two skin questionnaires (VitiQoL and Skindex-29+3)

5.4 DATA PREPARATION AND CLEANING

Data were entered into SPSS version 23 for data preparation, screening, and analysis. Data were assessed for normality (evaluating the symmetry and peakedness of the distributions) as well as the existence of outliers and the extent of missing data.

5.4.1 NON-NORMALITY, MISSING DATA, AND OUTLIERS

Normality was assessed by using skewness and kurtosis; non-normality was defined as having a skew $>|2|$ and kurtosis $>|7|$.²⁹⁹ From Table 5.4, the distributions of all the interval level variables did not exceed the skewness and kurtosis thresholds of

$>|2|$ and $>|7|$, respectively. Potential outliers were screened for by inspecting z-scores of continuous, interval variables. No outliers were identified in the data. Using SPSS's *Missing Value Analysis* feature, assessments were made regarding the amount and pattern of missing data. According to Tabachnick,²⁹⁶ the patterns of missing data is more important than the amount of missing data.

Non-random missing data is more problematic than random missing data and can seriously impact the generalizability of the study findings. Further, "If only a few data points, say 5% or less, are missing in a random pattern from a large data set, the problems are less serious."²⁹⁶ A total of 56 instances of missing data were observed across 116 survey items (N=57 respondents). Further examination of the survey data found that 21.1 percent (N=12) of respondents had at least one missing data value. The rate of missing data exceeded more than 5% for two variables – education, at a rate of 49.1% (n=28) and the sub-question for depression, at a rate of 55.6% (n=10). As a result, these variables were dropped from preliminary analyses.

Table 5.4: Skewness and Kurtosis Values of Interval-Level Variables

Variable	Skewness	Kurtosis
CLEQoL	0.52	-0.82
SF-36		
<i>Physical Component Summary (PCS)</i>	-0.09	-1.12
Physical Functioning (PF)	-0.23	-1.16
Role-Physical (RP)	0.32	-1.75
Bodily Pain (BP)	-0.09	-1.27
General Health (GH)	0.25	-0.87
<i>Mental Component Summary (MCS)</i>	-0.51	-0.34
Vitality (VT)	0.22	-0.79
Social Functioning (SF)	-0.13	-1.38
Role-Emotional (RE)	-0.67	-1.10
Mental Health (MH)	-0.77	0.26
Disease activity	1.81	5.95
Disease damage	0.65	-0.51
Disease duration	1.43	5.75
Pain	0.72	-0.89
Pruritus/Itch	0.44	-1.07
Fatigue	-0.67	-1.44
Body image	1.16	0.31
Comorbidity	0.61	-0.96
Side-effects from CLE medications	1.10	-0.60
Pill burden	0.89	-0.91
Skin health perception	-0.29	-1.09
Age	-0.06	-0.74
Income	1.56	4.14
Social support	-1.04	-0.30

5.5 CONSTRUCT VALIDITY AND INTERNAL CONSISTENCY

To assess construct validity, the factor structure of the CLEQoL scale was examined by conducting an exploratory factor analysis (EFA) on the 36 items via a maximum likelihood followed by a Varimax rotation with SPSS 23. The value of Kaiser–Meyer–Olkin (KMO) was 0.83, indicating that the data and sample were adequate for factor analysis. In addition, the approximate Chi-square value of the

Bartlett test of sphericity ($\chi^2 = 2126.96$, $df = 630$, $p < 0.001$) confirmed that the factor model is appropriate. These two tests showed the suitability of the respondent data for exploratory factor analysis.

Five factors/subscales were identified; three conformed to the initial subscales from the literature, corresponding to symptoms, emotions, and functioning. Two additional contributions to these existing factors/subscales were body image/cosmetic effects and photosensitivity [See Table 5.5]. As shown in Table 5.5, based on the scree plot (Fig. 5.1), the five factors that reported eigenvalues greater than 1, accounting for 72.68% of the variance, were extracted. Overall, the five subscales assessed overall QoL specific to CLE patients.

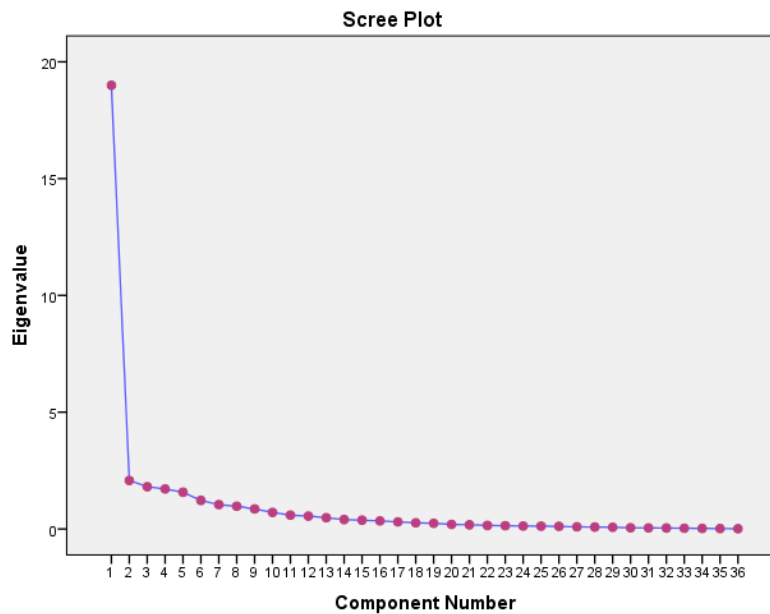


Figure 5.1: Scree plot analysis of factors in the CLEQoL scale

Table 5.5: Exploratory factor loadings of items in the CLEQoL with five factors

Item No.	Factors of CLEQoL subscales	Factor Loadings				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1: Emotions (% of variance = 52.77, Eigenvalue = 19.00)						
l.	I am ashamed of my skin condition	0.84	0.27	0.21	0.07	0.07
f.	My skin condition makes me feel depressed	0.77	0.24	0.11	0.12	0.21
u.	I am embarrassed by my skin condition.	0.67	0.42	0.27	0.19	0.18
bb.	I am annoyed by my skin condition	0.65	0.27	0.25	0.31	0.24
w.	I am frustrated by my skin condition	0.62	0.19	0.21	0.19	0.08
z.	I am humiliated by my skin condition	0.59	0.14	0.265	-0.01	0.19
i.	I worry about getting scars from my skin condition	0.58	0.14	0.23	0.42	-0.12
o.	I am angry about my skin condition.	0.41	0.28	0.55	0.29	0.11
c.	I worry that my skin condition may be serious	0.70	0.16	0.13	0.10	0.10
m.	I worry that my skin condition may get worse	0.59	0.09	0.13	0.07	0.08
Factor 2: Functioning (% of variance = 5.77, Eigenvalue = 2.01)						
e.	My skin condition affects my social life	0.25	0.65	0.27	0.18	0.13
h.	I tend to stay at home because of my skin condition	0.27	0.58	0.18	0.14	0.23
q.	My skin condition makes showing affection difficult	0.21	0.81	0.24	0.27	0.14
y.	My skin condition affects my desire to be with people	0.18	0.79	0.17	0.17	0.21
t.	My skin condition affects my interactions with others	0.26	0.76	0.19	0.23	0.10
cc.	My skin condition interferes with my sex life	0.24	0.76	0.28	0.10	0.01
v.	My skin condition is a problem for the people I love	0.12	0.75	0.21	0.26	0.10
k.	My skin condition affects how close I can be with those I love	0.10	0.73	0.20	0.19	0.01
n.	I tend to do things by myself because of my skin condition	0.24	0.54	0.53	0.04	0.18
d.	My skin condition makes it hard to work or do hobbies	0.19	0.44	0.22	0.27	0.21
b.	My skin condition affects how well I sleep	0.17	0.73	0.25	0.18	-0.01
dd.	My skin condition makes me tired	0.22	0.58	0.24	-0.12	0.14
Factor 3: Symptoms (% of variance = 5.03, Eigenvalue = 1.81)						
g.	My skin condition burns or stings	0.28	0.22	0.56	0.14	0.09
j.	My skin itches	0.21	0.10	0.50	0.24	-0.06
x.	My skin is sensitive	0.25	0.24	0.40	0.26	0.14
a.	My skin hurts	0.26	0.06	0.87	0.13	0.17
p.	Water bothers my skin condition (bathing, washing hands)	0.06	0.18	0.69	0.03	0.04
aa.	My skin condition bleeds	0.26	0.19	0.52	0.17	0.05
s.	My skin is irritated	0.24	0.23	0.52	0.12	0.09

Table 5.5: Exploratory factor loadings of items in the CLEQoL with five factors (Cont'd)

Item No.	Factors of CLEQoL subscales	Factor Loadings				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 4: Body Image/Cosmetic Effects (% of variance = 4.76, Eigenvalue = 1.71)						
hh.	When talking to someone, I sometimes worry about they may be thinking of me	0.18	0.09	0.27	0.62	0.21
ff.	I am worried about my hair loss	0.21	0.02	-0.11	0.61	0.02
ii.	My skin condition has influenced the clothes I wear.	0.17	0.12	0.14	0.79	0.03
jj.	My skin condition has affected my grooming practices (i.e., haircut, use of cosmetics)	0.16	0.18	0.08	0.49	0.24
Factor 5: Photosensitivity (% of variance = 4.37, Eigenvalue = 1.57)						
ee.	I worry about going outside because the sun might flare my disease	0.09	0.24	0.13	0.27	0.78
gg.	My skin condition prevents me from doing outdoor activities.	0.19	0.28	0.22	0.24	0.47
kk.	My skin condition has affected my sun protection efforts during recreation	0.15	0.01	-0.06	0.20	0.83
Boldface factor loadings correspond to the questions that are aligned within a particular factor						

Summary of Factors/Subscales and Item Clusters of CLEQoL

Factors/Subscales	Number of items	Cluster of items	Skewness	Kurtosis
Functioning	12	b; d; e; h; k; n; q; t; v; y; cc; dd	0.89	-0.35
Emotions	10	c; f; i; l; m; o; u; w; z; bb	0.36	-1.11
Symptoms	7	a; g; j; p; s; x; aa	0.17	-1.05
Body image/cosmetic effects	4	ff; hh; ii; jj	0.33	-0.95
Photosensitivity	3	ee; gg; kk	-0.35	-0.80

Reliability estimates for all of the multi-item scales were assessed via Cronbach's alpha, where an acceptable value of internal consistency is $\alpha \geq 0.60$ [See Table 5.6 below].³⁰³ All multi-item scales exhibited acceptable reliability.

Table 5.6: Reliability Analyses of Study Scales

Scale	Number of Items	Cronbach's Alpha
CLEQoL^a	36	0.97
<i>Functioning</i>	12	0.96
<i>Emotions</i>	10	0.94
<i>Symptoms</i>	7	0.89
<i>Body image/cosmetic effects</i>	4	0.71
<i>Photosensitivity</i>	3	0.74
SF-36	36	
<i>Physical Component Summary (PCS)</i>		0.87
<i>Physical Functioning (PF)</i>	10	0.95
<i>Role-Physical (RP)</i>	4	0.92
<i>Bodily Pain (BP)*</i>	2	0.75
<i>General Health (GH)</i>	5	0.78
<i>Mental Component Summary (MCS)</i>		0.81
<i>Vitality (VT)</i>	4	0.69
<i>Social Functioning (SF)*</i>	2	-0.74*
<i>Role-Emotional (RE)</i>	3	0.76
<i>Mental Health (MH)</i>	5	0.81
Body Image	10	0.95
Comorbidity	14	0.61

^a Item 18 on side-effects of treatment is not scored nor included in the final CLEQoL scale

*Estimated by Spearman correlation

5.6 DESCRIPTION OF STUDY VARIABLES

Descriptive statistics of study variables are described below [See Tables 5.7 – 5.26].

5.6.1 BIOLOGICAL AND PHYSIOLOGICAL FACTORS

CLE subtype

As shown in Table 5.7, patients with chronic CLE – DLE (N=39) represented the majority of survey respondents (68.4%).

Table 5.7: Frequency Distribution of CLE Subtype

Ethnicity	N	Percent (%)
Chronic CLE	46	80.7
<i>Discoid Lupus Erythematosus (DLE)</i>	39	68.4
<i>Tumid Lupus</i>	6	10.5
<i>Lupus Panniculitis</i>	1	1.8
Subacute Lupus Erythematosus (SCLE)	9	15.8
Acute Lupus Erythematosus (ACLE)	2	3.5
Total	57	100.0

Recoded CLE Subtype Variable

Ethnicity	N	Percent (%)
Discoid Lupus Erythematosus (DLE)	39	68.4
Non-Discoid Lupus Erythematosus (Non-DLE)	18	31.6
Total	57	100.0

Cutaneous Lupus Disease Area and Severity Index (CLASI) Scores

CLASI activity score ranged from 0-29 and had a mean±SD score of 5.51±5.41 indicating mild activity. Similarly, the mean±SD damage score was 8.05±7.11 [See Table 5.8].

Table 5.8: Means and Ranges of CLASI Scores

	N	Mean	SD	Min	Max	Median	IQR
^a Disease Activity	57	5.51	5.41	0	29.00	4.00	5.00
^b Disease Damage	57	8.05	7.11	0	26.00	6.00	12.00

^{a,b}The CLASI disease activity and damage scores range from 0 to 70 each

Disease Duration

From Table 5.9, the average year since diagnosis was 7.12±8.45 years, with a range of 0.10 years (1.5 months) to 39.96 years.

Table 5.9: Mean and Range of Disease Duration

	N	Mean	SD	Min	Max	Median	IQR
Disease Duration	57	7.12	8.45	0.10	39.96	4.43	7.96

5.6.2 SYMPTOM STATUS

Pain

Patients most commonly (42.1%) experienced no pain in the last 24 hours. The average pain score was 3.16±3.46 (median of 2.00). Based on the average pain score, patients reported experiencing mild pain within the 24-hour period [See Table 5.10].

Pruritus/Itch

From Table 5.10, plurality of patients (28.1%) reported experiencing no itching. The pruritus/itch scale had a mean of 3.78 ± 3.39 (median of 3.00); this indicates that patients experienced mild levels of pruritus/itch within the 24-hour period.

Fatigue

As shown in Table 5.10, most patients either equally experienced no fatigue (14.5%) and severe levels of fatigue (14.5%) within the 24-hour period. On average, the fatigue scale was 5.18 ± 3.57 (median of 5.00), suggesting that patients experienced moderate levels of fatigue.

Table 5.10: Mean and Frequency Distribution of Symptom Status

	N ^a	Mean	SD	No Pain (0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Pain as bad as can imagine (10)
1 On average, how much PAIN have you experienced in the last 24 hrs ?	57	3.16	3.46	24 (42.1)	3 (5.3)	4 (7.0)	6 (10.5)	1 (1.8)	4 (7.0)	3 (5.3)	3 (5.3)	3 (5.3)	2 (3.5)	4 (7.0)
2 On average, how much ITCH have you experienced in the last 24 hrs ?	55	3.78	3.39	No itch (0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Itch as bad as can imagine (10)
				16 (28.1)	4 (7.0)	5 (8.8)	4 (7.0)	5 (8.8)	5 (8.8)	3 (5.3)	4 (7.0)	4 (7.0)	2 (3.5)	5 (8.8)
3 On average, how much FATIGUE have you experienced in the past week ?	55	5.18	3.57	No fatigue (0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Fatigue as bad as can imagine (10)
				8 (14.5)	4 (7.3)	3 (5.5)	6 (10.9)	4 (7.3)	5 (9.1)	2 (3.6)	3 (5.5)	5 (9.1)	7 (12.7)	8 (14.5)

^aTotals do not equal 57 due to missing responses

5.6.3 FUNCTIONING

Body Image

Body image was operationalized through 10 items from the Body Image Scale,²⁸⁹ which was developed in collaboration with the European Organization for Research and Treatment of Cancer (EORTC) Quality of Life Study Group. The 10-item scale was scored from 0 (not at all) to 3 (very much), with a possible score range of 0-30. Total body image scale had a mean of 8.78±8.92 and a median score of 6.00 [See Table 5.11]. The total average score indicates that participants had a lesser degree of body image dissatisfaction.

The highest means±SD per individual items (scored 0–3) were noted for items referring to dissatisfaction with the appearance of scar (1.25±1.16), perceived change in physical attractiveness (1.16±1.20), self-consciousness (1.09±1.09), dissatisfaction with body (0.91±1.06), and dissatisfaction when dressed (0.91±1.02). Internal consistency of the items on the Body Image Scale was acceptable at a Cronbach's $\alpha = 0.95$ [See Table 5.12].

Table 5.11: Mean Total Body Image Scores

Variable	N ^a	Mean	Median	SD	Minimum	Maximum
Body Image	57	8.78 ^a	6.00	8.92	0.00	30.00

^aThe composite score for the overall scale calculation based on 57 responses, possible scale range 0 to +30

Table 5.12: Frequency Distribution of the Body Image Scale

		Frequency Distribution of Response Choices N (%)						
		N ^a	Mean	SD	Not at all (0)	A little bit (1)	Quite a bit (2)	Very much (3)
a)	Have you been feeling self-conscious about your appearance?	55	1.09	1.09	21 (38.2)	17 (30.9)	8 (14.0)	9 (16.4)
b)	Have you felt less physically attractive as a result of your disease or treatment?	55	1.16	1.20	23 (41.8)	12 (21.8)	8 (14.5)	12 (21.8)
c)	Have you been dissatisfied with your appearance when dressed?	55	0.91	1.02	26 (47.3)	13 (23.6)	11 (20.0)	5 (9.1)
d)	Have you been feeling less feminine/masculine as a result of your disease or treatment?	55	0.78	1.08	31 (56.4)	13 (23.6)	3 (5.5)	8 (14.5)
e)	Did you find it difficult to look at yourself naked?	55	0.62	0.97	35 (63.6)	11 (20.0)	4 (7.3)	5 (9.1)
f)	Have you been feeling less sexually attractive as a result of your disease or treatment?	55	0.76	1.07	32 (58.2)	11 (20.0)	5 (9.1)	7 (12.7)
g)	Did you avoid people because of the way you felt about your appearance?	55	0.75	1.02	31 (56.4)	13 (23.6)	5 (9.1)	6 (10.9)
h)	Have you been feeling the treatment has left your body less whole?	55	0.55	0.96	38 (69.1)	9 (16.4)	3 (5.5)	5 (9.1)
i)	Have you felt dissatisfied with your body?	55	0.91	1.06	26 (47.3)	15 (27.3)	7 (12.7)	7 (12.7)
j)	Have you been dissatisfied with the appearance of your scar?	55	1.25	1.16	18 (32.7)	18 (32.7)	6 (10.9)	13 (23.6)
Score Total		55	8.78 ^b	8.92				
Cronbach's Alpha ^c		0.95 ^c						

^aTotals do not equal 57 due to missing responses^bThe composite score for the overall scale calculation based on 57 responses, possible scale range 0 to +30^cCronbach's alpha based on 10 items

Depression

When asked if they have ever been diagnosed with depression, the majority of respondents (68.4%) indicated having no prior diagnosis of depression [See Table 5.13].

Table 5.13: Mean and Frequency Distribution of Depression

Depression	N	Percent
“0”(No)	39	68.4
“1”(Yes)	18	31.6
Score Total	57	100

If yes, are you currently being treated for depression?

	N^a	Percent
“0”(No)	-	-
“1”(Yes)	8	100
Score Total	8	100

^aTotals do not equal 18 due to missing responses

Comorbidity

Comorbidity was measured with 14 items from the Self-Administered Comorbidity Questionnaire (SCQ).²⁹⁰ As shown in Table 5.14, the SCQ scale had a mean of 3.32 ± 3.23 (median=2.00), indicating lower comorbidity level and limitations. Since there are 14 questions with three binary questions, the possible range for the total scores is 0 to 42 [See Table 5.14]. Most of the participants indicated having high blood pressure (45.1%) and back pain (43.1%). Out of those who indicated having high blood pressure, a majority of them were receiving medication/treatment for it (95.5%) and about 85 percent of these patients thought that having high blood pressure did not limit

them. Similarly, out of the patients who positively responded to having back pain, seventy-five percent (75%) did not receive medication/treatment for it and most (72.2%) indicated limitations. Internal consistency of the items on the SCQ scale was acceptable (Cronbach's $\alpha = 0.61$). Findings are summarized in Table 5.15.

Table 5.14: Mean Total Comorbidity Scores

Variable	N	Mean	Median	SD	Minimum	Maximum
Comorbidity	57	3.32 ^a	2.00	3.23	0.00	10.00

^aThe composite score for the overall scale calculation based on 57 responses, possible scale range 0 to +42

Table 5.15: Mean and Frequency Distribution of Total Comorbidity Scores

		Frequency Distribution of Response Choices N (%)						
		N ^a	#1: Do you have the problem?		#2: Do you receive medications/treatment for it?	#3: Does it limit your activities?		
			No	Yes	<i>if “Yes”</i> →No	Yes	No	Yes
a)	Heart disease	50	45 (90.0)	5 (10.0)	5 (55.6)	4 (44.4)	6 (85.7)	1 (14.3)
b)	High blood pressure	51	28 (54.9)	23 (45.1)	1 (4.5)	21 (95.5)	17 (85.0)	3 (15.0)
c)	Lung disease	50	48 (96.0)	2 (4.0)	3 (75.0)	1 (25.0)	4 (80.0)	1 (20.0)
d)	Diabetes	49	44 (89.9)	5 (10.2)	3 (50.0)	3 (50.0)	5 (71.4)	2 (28.6)
e)	Ulcer or stomach disease	50	45 (90.0)	5 (10.0)	4 (57.1)	3 (42.9)	3 (85.0)	2 (15.0)
f)	Kidney disease	49	43 (87.8)	6 (12.2)	2 (25.0)	6 (75.0)	1 (14.3)	6 (85.7)
g)	Liver disease	50	49 (98.0)	1 (2.0)	2 (100)	-	2 (100)	-
h)	Anemia or other blood disease	50	38 (76.0)	12 (24.0)	7 (70.0)	3 (30.0)	6 (75.0)	2 (25.0)
i)	Cancer	50	45 (90.0)	5 (10.0)	4 (100)	-	3 (100)	-
j)	Depression	50	38 (76.0)	12 (24.0)	1 (10.0)	9 (90.0)	7 (63.6)	4 (36.4)
k)	Osteoarthritis, Degenerative arthritis	50	44 (88.0)	6 (12.0)	6 (75.0)	2 (25.0)	4 (44.4)	5 (55.6)
l)	Back pain	51	29 (56.9)	22 (43.1)	15 (75.0)	5 (25.0)	5 (27.8)	13 (72.2)
m)	Rheumatoid arthritis	50	42 (84.0)	8 (16.0)	8 (72.7)	3 (27.3)	3 (33.3)	6 (66.7)
n)	Hepatitis	50	49 (98.0)	1 (2.0)	3 (100)	-	-	-
o)	HIV	48	47 (97.9)	1 (2.1)	2 (66.7)	1 (33.3)	3 (75.0)	1 (25.0)
Cronbach’s Alpha ^a		0.61 ^b						

^aTotals do not equal 18 due to missing responses; ^bCronbach's alpha based on 15 items.

5.6.4 GENERAL HEALTH PERCEPTIONS

Side-effects associated with CLE medications

Side-effects were measured using a single item from the LupusPRO.²⁹² From Table 5.16, the average score was 0.98 ± 1.55 , which indicated that patients experienced serious side-effects associated with CLE medications most of the time in the past four weeks, with *all of the time* being the most common response (68.4%).

Pill Burden

Similarly, pill burden was measured using a single item from the LupusPRO.²⁹² On average, the scale had a mean of 1.21 ± 1.59 indicating that patients felt concerned most of the time about the number of CLE medications they currently take. Also, most patients commonly had concerns (58.4% indicated “all of the time”) about the number of medications they take for CLE [See Table 5.16].

Table 5.16: Mean and Frequency Distribution of Side-effects from CLE Medications and Pill burden

		Frequency Distribution of Response Choices N (%)						
	N ^a	Mean	SD	All of the time (0)	Most of the time (1)	Some of the time (2)	A little of the time (3)	None of the time/Not applicable (4)
a. Serious side-effects associated with CLE medications.	57	0.98	1.55	39 (68.4)	2 (3.5)	1 (1.8)	8 (14.0)	7 (12.3)
b. Concerns about the number of medications you currently take for your CLE.	53	1.21	1.59	31 (58.4)	8 (15.1)	3 (5.7)	5 (9.4)	6 (11.4)

^aTotals do not equal 57 due to missing responses

Skin Health Perception

About 16 percent (15.8%) of patients most commonly reported having a neutral perception regarding their skin health. The average score on this measure was 5.14 ± 3.02 [See Table 5.17].

Table 5.17: Mean and Frequency Distribution of Skin Health Perception

	N	Mean	SD	Frequency Distribution of Response Choices (%)										Perfect health (10)
				Worst skin (0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Estimate your skin-related health on a 1-10 scale as you see it today?	57	5.14	3.02	6 (10.5)	3 (5.3)	5 (8.8)	5 (8.8)	1 (1.8)	9 (15.8)	6 (10.5)	6 (10.5)	8 (14.0)	6 (10.5)	2 (3.5)

5.6.5 CHARACTERISTICS OF THE INDIVIDUAL

Age

The mean age of the respondents was 49.2 ± 12.9 years (median = 51.00; mode = 52.00), with a range of 23 to 78 years.

Gender

The current sample of patients comprised mostly of females (84.2%) as summarized below in Table 5.18.

Table 5.18: Frequency Distribution of Respondents' Gender

Gender	N	Percent (%)
Female	48	84.2
Male	9	15.8
Total	57	100.0

Education

As depicted in Table 5.19, most (69.0%) of respondents reported their highest educational achievement as either high school or college. Due to several missing data, this variable was not included in the final analysis.

Table 5.19: Frequency Distribution of Education

Education	N	Percent (%)
Lower than High School	5	17.2
High School	10	34.5
College	10	34.5
Graduate Degree	4	13.8
Total	29^a	100.0

^aTotals do not equal 57 due to missing responses

Race/Ethnicity

As shown in Table 5.20, African-American patients (N=31) represented the majority of survey respondents (54.4%).

Table 5.20: Frequency Distribution of Race/Ethnicity

Ethnicity	N	Percent (%)
African-American	31	54.4
Caucasian	18	31.6
Hispanic	5	8.8
Other ^a	2	3.5
Asian	1	1.8
Total	57^a	100.0

^aRepresents those of mixed race/ethnicities

Recoded Race/Ethnicity Variable

Ethnicity	N	Percent (%)
African-American/Black	31	54.4
Others (Caucasian, Hispanic, Asian, and Other)	26	45.6
Total	57	100.0

Smoking Status

Table 5.21 details the smoking status of respondents. Slightly over half (53.4%) of respondents reported never smoking cigarettes. In addition, approximately 32 percent reported being current cigarette smokers (31.5%).

Table 5.21: Frequency Distribution of Smoking Status

Smoking Status	N	Percent (%)
Never Smoker	29	53.7
Current Smoker	17	31.5
Former Smoker	8	14.8
Total	54^a	100.0

^aTotals do not equal 57 due to missing responses

Recoded Smoking Status Variable

Smoking Status	N	Percent (%)
Never Smoker	29	53.7
Current/Former Smoker	25	46.3
Total	54^a	100.0

^aTotals do not equal 57 due to missing responses

5.6.6 CHARACTERISTICS OF THE ENVIRONMENT

Marital Status

Forty-nine percent (49.1%) of the respondents most commonly reported either being married or having a domestic partner. When recoded, those who were not married (single, divorced, widowed, and separated) comprised a little more than half of the patient sample (50.9%) [See Table 5.22].

Table 5.22: Frequency Distribution of Respondents' Marital Status

Marital Status	N	Percent (%)
Married/Domestic Partner	28	49.1
Single	20	35.1
Divorced	7	12.3
Widowed	2	3.5
Total	57	100.0

Recoded Marital Status Variable

Marital Status	N	Percent (%)
Not Married	29	50.9
Married/Domestic Partner	28	49.1
Total	57	100.0

Income

Using ZIP code data, the average annual income of the respondents was \$54,570±24,074 (median = \$50,279; mode = \$36,704), with a range of \$15,258 to \$152,986.

Social Support

Using a single measure from LupusPRO,²⁹² social support was measured on a 5-point Likert scale. From Table 5.23, the average score was 3.00±1.35, which indicated

that patients received support from their friends and or family most of the time. Also, most patients commonly responded to receiving social support all of the time (56.4%).

Table 5.23: Mean and Frequency Distribution of Social Support

Item	N ^a	Mean	SD	Frequency Distribution of Response Choices (%)				
				None of the time/Not applicable (0)	A little of the time (1)	Some of the time (2)	Most of the time (3)	All of the time (4)
Generally, I receive support from friends and/or family...	55	3.00	1.35	4 (7.3)	6 (10.9)	7 (12.7)	7 (12.7)	31 (56.4)

^aTotals do not equal 57 due to missing responses

5.6.7 OVERALL QUALITY OF LIFE

CLEQoL

Overall QoL, operationalized as CLEQoL, was one of the primary dependent variables measured with 36 questions using a 5-point Likert scale ranging from 0 (no effect) to 100 (effect experienced all the time), with higher scores indicating poorer overall quality of life. The individual means for CLEQoL questions (a-kk) are presented in Table 5.24. The highest means \pm SD per individual items were noted for items referring to the effect CLE has on sun protection efforts (67.86 \pm 37.45), worrying about sun flares (63.16 \pm 36.01), and skin sensitivity (62.71 \pm 32.78). Internal consistency of the items on the CLEQoL scale was acceptable at a Cronbach's $\alpha = 0.97$.

The photosensitivity subscale had the highest mean score 61.90 \pm 30.44. The total CLEQoL score was 39.68 and a median of 31.60; this indicates that respondents had moderately high QoL [See Table 5.25]. The CLEQoL scale alpha value was 0.97, which met the acceptable level of 0.6.

To make the CLEQoL domains comparable to SF-36 so as to make inferences from the results, the five subscales were condensed to CLEQoL-Mental (Emotions) and CLEQoL-Physical (Symptoms, functioning, body image/cosmetic issues, and photosensitivity).

Table 5.24: Means and Frequency Distributions of Overall QoL – CLEQoL

	N ^a	Frequency Distribution of Response Choices (%)						
		Mean	SD	Never (0)	Rarely (25)	Sometimes (50)	Often (75)	All of the time (100)
a. Skin Hurts (Sx)	57	39.47	33.39	17 (29.8)	10 (17.5)	16 (28.1)	8 (10.5)	6 (10.5)
b. Disrupted sleep (Em)	57	32.02	34.97	26 (45.6)	7 (12.3)	11 (19.3)	8 (14.0)	5 (8.8)
c. Worry about progression (Fxn)	57	49.56	35.19	12 (21.1)	9 (15.8)	15 (26.3)	10 (17.5)	11 (19.3)
d. Affects work and hobbies (Em)	57	39.04	35.99	17 (29.8)	15 (26.3)	11 (19.3)	4 (7.0)	10 (17.5)
e. Affects social life (Em)	57	34.21	39.14	27 (47.7)	7 (12.3)	8 (14.0)	5 (8.8)	10 (17.5)
f. Depressed (Fxn)	57	37.28	37.83	23 (40.4)	8 (14.0)	10 (17.5)	7 (12.3)	9 (15.8)
g. Skin burns or stings (Sx)	57	42.98	36.21	18 (31.6)	6 (10.5)	16 (28.1)	8 (14.0)	9 (15.8)
h. Stay at home (Em)	57	33.77	39.10	27 (47.7)	8 (14.0)	7 (12.3)	5 (8.8)	10 (17.5)
i. Worry about scars (Fxn)	57	55.26	38.31	11 (19.3)	10 (17.5)	10 (17.5)	8 (14.0)	18 (31.6)
j. Skin itches (Sx)	57	57.89	33.13	8 (14.0)	6 (10.5)	16 (28.1)	14 (24.6)	13 (22.8)
k. Affects closeness (Em)	57	26.75	35.31	32 (56.1)	5 (8.8)	10 (17.5)	4 (7.0)	6 (10.5)
l. Ashamed (Fxn)	57	41.23	38.81	20 (35.1)	10 (17.5)	8 (14.0)	8 (14.0)	11 (19.3)
m. Worry skin worse (Fxn)	57	56.14	35.76	9 (15.8)	10 (17.5)	11 (19.3)	12 (21.1)	15 (26.3)
n. Do things alone (Em)	57	27.63	33.97	29 (50.9)	8 (14.0)	10 (17.5)	5 (8.8)	5 (8.8)
o. Angry (Fxn)	57	27.19	34.16	30 (52.6)	6 (10.5)	13 (22.8)	2 (3.5)	6 (10.5)
p. Water bothers (Sx)	57	17.98	29.41	37 (64.9)	9 (15.8)	3 (5.3)	6 (10.5)	2 (3.5)
q. Difficult showing affection (Em)	57	22.81	33.50	34 (59.6)	7 (12.3)	9 (15.8)	1 (1.8)	6 (10.5)
r. Side-effects from medicine*	57	56.14	33.83	9 (15.8)	5 (8.8)	20 (35.1)	9 (15.8)	14 (24.6)
s. Skin irritated (Sx)	57	53.95	34.97	10 (17.5)	7 (12.3)	18 (31.6)	8 (14.0)	14 (24.6)

Table 5.24: Means and Frequency Distributions of Overall QoL – CLEQoL (Cont'd)

		Frequency Distribution of Response Choices (%)							
		N ^a	Mean	SD	Never (0)	Rarely (25)	Sometimes (50)	Often (75)	All of the time (100)
t.	Interaction with others (Em)	57	28.51	35.81	30 (52.6)	6 (10.5)	11 (19.3)	3 (5.3)	7 (12.3)
u.	Embarrassed (Fxn)	57	40.35	39.46	22 (38.6)	6 (10.5)	14 (24.6)	2 (3.5)	13 (22.8)
v.	Problem for loved ones (Em)	57	13.16	25.49	42 (73.7)	5 (8.8)	7 (12.3)	1 (1.8)	2 (3.5)
w.	Frustration (Fxn)	57	45.18	39.09	19 (33.3)	5 (8.8)	14 (24.6)	6 (10.5)	13 (22.8)
x.	Skin sensitive (Sx)	57	62.72	32.78	7 (12.3)	4 (7.0)	15 (26.3)	15 (26.3)	16 (28.1)
y.	Affects desires for others (Em)	57	24.12	35.66	35 (61.4)	6 (10.5)	5 (8.8)	5 (8.8)	6 (10.5)
z.	Humiliated by skin (Fxn)	57	25.88	35.97	33 (57.9)	6 (10.5)	8 (14.0)	3 (5.3)	7 (12.3)
aa.	Skin bleeds (Sx)	57	19.74	25.76	31 (54.4)	13 (22.8)	7 (12.3)	6 (10.5)	0 (0.0)
bb.	Annoyed (Fxn)	57	44.30	36.91	18 (31.6)	5 (8.8)	16 (28.1)	8 (14.0)	10 (17.5)
cc.	Sex life interference (Em)	57	18.86	33.50	39 (68.4)	7 (12.3)	3 (5.3)	2 (3.5)	6 (10.5)
dd.	Tired (Em)	57	34.65	35.91	24 (42.1)	8 (14.0)	10 (17.5)	9 (15.8)	6 (10.5)
ee.	Worry about sun flares (Ph)	57	63.16	36.01	9 (15.8)	4 (7.0)	12 (21.1)	12 (21.1)	20 (35.1)
ff.	Worry about hair loss (Bod)	57	55.70	39.53	13 (22.8)	8 (14.0)	7 (12.3)	11 (19.3)	18 (31.6)
gg.	Prevents outdoor activities (Ph)	57	54.39	38.42	13 (22.8)	6 (10.5)	13 (22.8)	8 (14.0)	17 (29.8)
hh.	Worry about what others are thinking (Bod)	57	29.82	35.49	28 (49.1)	8 (14.0)	9 (15.8)	6 (10.5)	6 (10.5)
ii.	Influence clothes (Bod)	57	42.54	42.25	24 (42.1)	4 (7.0)	9 (15.8)	5 (8.8)	15 (26.3)
jj.	Affects grooming practices (Bod)	56	41.07	41.13	22 (39.3)	9 (16.1)	5 (8.9)	7 (12.5)	13 (23.2)
kk.	Affects sun protection efforts (Ph)	56	67.86	37.45	9 (16.1)	4 (7.1)	6 (10.7)	12 (21.4)	25 (44.6)
Score Total		56	39.29 ^b	25.68					
Cronbach's Alpha ^c		0.97							

^aItem 18 on side-effects of treatment is not scored nor included in the final CLEQoL scale

^aTotals do not equal 57 due to missing responses

^bThe composite score for the overall scale calculation based on 57 responses, possible scale range 0 to 100

^cCronbach's alpha based on 36 items

Sx = Symptoms; Em = Emotions; Fxn = Functioning; Bod = Body image/Cosmetic effects; Ph = Photosensitivity

Table 5.25: Mean CLEQoL Scores, Standard Deviations, and Cronbach's Alpha

Subscale/Domains	N^a	Mean^b	Median	SD	Min	Max	Cronbach's α^c
Emotions	57	42.24	37.50	29.64	0	100.00	0.94
Symptoms	57	42.11	39.29	25.07	0	89.29	0.89
Functioning	57	27.96	14.58	28.52	0	100.00	0.97
Body image/cosmetic effects	56	42.41	37.50	28.99	0	100.00	0.71
Photosensitivity	56	61.90	66.67	30.44	0	100.00	0.74
Total Score	56	39.29	31.60	25.68	0	97.92	0.97

^aTotals do not equal 57 due to missing responses

^bThe composite score for the overall scale calculation based on 57 responses, possible scale range 0 to 100

^cCronbach's alpha based on 36 items

Recoded CLEQoL Domain Mean Scores, Standard Deviations, and Cronbach's Alpha

Domains	N^a	Mean^b	Median	SD	Min	Max	Cronbach's α	Skewness	Kurtosis
Mental	57	42.24	37.50	29.64	0	100.00	0.94 ^c	0.36	-1.11
Physical	56	38.07	32.21	24.79	0.96	97.12	0.96 ^d	0.58	-0.66
Total Score	56	39.29	31.60	25.68	0	97.92	0.97^e	0.52	-0.82

^aTotals do not equal 57 due to missing responses

^bThe composite score for the overall scale calculation based on 57 responses, possible scale range 0 to 100

^cCronbach's alpha based on 10 items

^dCronbach's alpha based on 26 items

^eCronbach's alpha based on 36 items

SF-36

The SF-36⁵² was the measure for the second dependent variable in this study. The items therein measure responses to eight subscales that relate to general health including physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional and mental health. Each item is transformed from a 0 -100 scale and converted to a norm-based score that is reflective of the U.S. general population. In addition to obtaining the scores for the eight subscales, two overall

summary scores also ranging from 0 to 100 were obtained –Physical Component Summary (PCS) and Mental Component Summary (MCS) scores.

Mean PCS and MCS scores were 39.93±12.68 and 45.68±11.56, respectively, indicating that both the physical health and mental health scores were below the U.S. general population norm (50±10). Patients scored higher on the MCS domain than under the PCS domain, with mental health (MH) (67.93±23.65), role-emotional (RE) (65.50±39.32), and social functioning (SF) (64.91±30.93) being the highest scores. These findings are summarized in Table 5.26.

Table 5.26: Mean SF-36 Scores, Standard Deviations, and Cronbach's Alpha

Subscale/Component Score	N ^a	Mean ^b	Median	SD	Min	Max	Cronbach's α^c
PCS	56	39.93	39.92	12.68	14.56	60.05	0.87
Physical Functioning (PF)	57	58.33	55.00	31.47	0	100.00	0.95
Role-Physical (RP)	56	43.42	25.00	44.70	0	100.00	0.92
Bodily Pain (BP)	56	60.14	52.00	30.00	0	100.00	0.75 [*]
General Health (GH)	56	47.00	42.00	24.55	0	97.00	0.78
MCS	55	45.68	47.73	11.56	17.24	65.25	0.81
Vitality (VT)	56	40.09	35.00	25.83	0	100.00	0.69
Social Functioning (SF)	55	64.91	62.50	30.93	0	100.00	-0.74 [*]
Role-Emotional (RE)	57	65.50	66.67	39.32	0	100.00	0.76
Mental Health (MH)	55	67.93	72.00	23.65	0	100.00	0.81

^aTotals do not equal 57 due to missing responses; ^bThe composite score for the overall scale calculation based on 57 responses, possible scale range 0 to 100; ^cCronbach's alpha based on 36 items; ^{*}Estimated by Spearman correlation; PCS: Physical Component Summary; MCS: Mental Component Summary

5.7 BIVARIATE ANALYSES AMONG THE REVISED WILSON AND CLEARY MODEL CONSTRUCTS

To build the parsimonious model, appropriate bivariate analyses were conducted with each predictor variable. The summary of the results are below.

5.7.1 Pearson's Correlations

Table 5.27 shows the Pearson's correlations among the measures (subscale scores) of the CLEQoL scale. All five subscales were significantly and positively correlated with each other at a significance level of $p < 0.01$.

Table 5.27: Inter-Scale Correlations Matrix of the CLEQoL (N=57)

	EM	SX	FXN	BOD	PH	Mental	Physical
EM	1.00						
SX	0.81**	1.00					
FXN	0.88**	0.78**	1.00				
BOD	0.76**	0.58**	0.72**	1.00			
PH	0.58**	0.49**	0.58**	0.70**	1.00		
Mental	1.00**	0.81**	0.88**	0.76**	0.58**	1.00	
Physical	0.91**	0.87**	0.96**	0.82**	0.71**	0.91**	1.00

Emotions (EM); Symptoms (SX); Functioning (FXN); Body image/Cosmetic effects (BOD); Photosensitivity (PH); Mental (CLEQoL-Mental); Physical (CLEQoL-Physical)

Note: Pearson's correlations are significant at * $p < 0.05$, ** $p < 0.01$

Table 5.28 shows the Pearson's correlations among the measures (subscale scores) of the SF-36 scale. All the domains and component scores were significantly and positively correlated with each other at a significance level of $p < 0.05$.

Table 5.28: Inter-Scale Correlations Matrix of the SF-36 (N=57)

	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS
PF	1.00									
RP	0.73**	1.00								
BP	0.78**	0.69**	1.00							
GH	0.73**	0.55**	0.60**	1.00						
VT	0.69**	0.56**	0.69**	0.76**	1.00					
SF	0.71**	0.57**	0.78**	0.63**	0.60**	1.00				
RE	0.57**	0.61**	0.58**	0.44**	0.43**	0.56**	1.00			
MH	0.42**	0.41**	0.41**	0.58**	0.58**	0.58**	0.53**	1.00		
PCS	0.92**	0.82**	0.85**	0.73**	0.70**	0.67**	0.45**	0.27*	1.00	
MCS	0.44**	0.43**	0.50**	0.57**	0.62**	0.69**	0.75**	0.92**	0.29*	1.00

Physical Functioning (PF); Role-Physical (RP); Bodily Pain (BP); General Health (GH); Vitality (VT); Social Functioning (SF); Role-Emotional (RE); Mental Health (MH); Physical Component Summary (PCS); Mental Component Summary (MCS)

Note: Pearson's correlations are significant at * $p < 0.05$, ** $p < 0.01$

Table 5.29 shows the Pearson's correlations among the subscale scores of CLEQoL and the predictor variables (interval-level) in the model. Summary of the findings are below.

CLEQoL-Mental Domain

Disease activity, pain, itch, fatigue, and body image were significantly and positively correlated with *CLEQoL-Mental* at a significance of $p<0.01$. Skin health perception, age, and social perception were significantly and negatively correlated with *CLEQoL-Mental* at a significance of $p<0.05$.

CLEQoL-Physical Domain

Disease activity, pain, itch, fatigue, and body image were significantly and positively correlated with *CLEQoL-Physical* at a significance of $p<0.01$, while skin health perception and social support were significantly and negatively correlated with *CLEQoL-Physical* at a significance of $p<0.01$.

The Pearson's correlations among the component scores of the SF-36 and the predictor variables (interval-level) in the model are depicted below in Table 5.30 as well as the summary of the findings.

SF-36 Physical Component Summary (PCS)

Pain, itch, fatigue, and body image were significantly and negatively correlated with *PCS* at a significance of $p<0.01$. Skin health perception was significantly and positively correlated with *PCS* at a significance of $p<0.05$.

SF-36 Mental Component Summary (MCS)

Pain, itch, fatigue, and body image were significantly and negatively correlated with *MCS* at a significance of $p < 0.01$. Social support was significantly and positively correlated with *MCS* at a significance of $p < 0.01$.

Table 5.29: Correlations of Predictor Variables with CLEQoL (N=57)

	MTL	PHY	CDA	CDD	DxD	PAIN	ITCH	FAT	BIM	COM	SIDE	PB	SKH	AGE	INC	SOS
MTL	1.00**															
PHY	0.91**	1.00														
CDA	0.33*	0.35**	1.00													
CDD	0.24	0.20	0.53**	1.00												
DxD	-0.13	-0.16	0.04	0.21	1.00											
PAIN	0.59**	0.65**	0.31*	0.31*	0.07	1.00										
ITCH	0.57**	0.58**	0.35**	0.31*	0.05	0.72**	1.00									
FAT	0.58**	0.63**	0.14	0.06	-0.12	0.66**	0.49**	1.00								
BIM	0.79**	0.78**	0.36**	0.16	-0.21	0.62**	0.51**	0.51**	1.00							
COM	-0.02	-0.03	0.02	0.16	0.16	-0.10	0.07	-0.22	-0.11	1.00						
SIDE	-0.02	0.03	0.07	-0.06	0.07	0.03	0.05	0.08	0.02	-0.01	1.00					
PB	0.06	0.06	0.13	0.13	0.11	0.06	0.09	0.18	-0.01	0.02	0.00	1.00				
SKH	-0.40**	-0.39**	-0.31*	-0.15	0.12	-0.38**	-0.31**	-0.28**	-0.47**	-0.01	0.12	0.02	1.00			
AGE	-0.28*	-0.25	0.03	-0.09	0.12	-0.06	-0.21	0.05	-0.30*	0.03	-0.31*	0.20	-0.09	1.00		
INC	-0.04	-0.01	-0.03	-0.27*	-0.13	-0.08	0.18	0.07	0.04	-0.08	-0.07	-0.25	-0.11	0.17	1.00	
SOS	-0.38**	-0.36**	0.19	-0.38**	0.17	-0.17	0.21	-0.01	-0.46**	-0.21	0.01	-0.09	0.22	0.18	-0.03	1.00

Mental (MTL); Physical (PHY); CLASI Disease Activity (CDA); CLASI Disease Damage (CDD); Disease Duration (DxD); Pain (PAIN); Pruritus/Itch (ITCH); Fatigue (FAT); Body Image (BIM); Comorbidity (COM); Side-effects from CLE Medications (SIDE); Pill Burden (PB); Skin Health Perception (SKH); Age (AGE); Income (INC); Social Support (SOS)

Note: Pearson's correlations are significant at *p < 0.05, **p < 0.01

Table 5.30: Correlations of Predictor Variables with SF-36 (N=57)

	PCS	MCS	CDA	CDD	DxD	PAIN	ITCH	FAT	BIM	COM	SIDE	PB	SKH	AGE	INC	SOS
PCS	1.00															
MCS	0.29*	1.00														
CDA	-0.21	-0.20	1.00													
CDD	-0.16	-0.16	0.53**	1.00												
DxD	0.06	-0.05	0.04	0.21	1.00											
PAIN	-0.70**	-0.55*	0.31*	0.31*	0.07	1.00										
ITCH	-0.42**	-0.59**	0.35**	0.31*	0.05	0.72**	1.00									
FAT	-0.71**	-0.44**	0.14	0.06	-0.12	0.66**	0.49**	1.00								
BIM	-0.50**	-0.38**	0.36**	0.16	-0.21	0.62**	0.51*	0.51**	1.00							
COM	0.12	0.03	0.02	0.16	0.16	-0.10	0.07	-0.22	-0.11	1.00						
SIDE	-0.19	-0.05	0.07	-0.06	0.07	0.03	0.05	0.08	0.02	-0.01	1.00					
PB	-0.12	-0.08	0.13	0.13	0.11	0.06	0.09	0.18	-0.01	0.02	0.00	1.00				
SKH	0.33*	0.24	-0.31*	-0.15	0.12	-0.38**	-0.31*	-0.28*	-0.47**	-0.01	0.12	0.02	1.00			
AGE	0.04	0.12	-0.03	-0.09	0.12	-0.06	-0.21	-0.05	-0.30**	0.03	-0.31	0.20	-0.09	1.00		
INC	0.04	-0.01	-0.03	-0.27*	-0.13	-0.08	0.18	0.07	0.04	-0.08	-0.07	-0.25	-0.11	0.17	1.00	
SOS	0.09	0.35**	-0.19	-0.38**	0.17	-0.17	-0.22	-0.01	-0.46**	-0.21	0.01	-0.09	0.22	0.18	-0.03	1.00

Physical Component Summary (PCS); Mental Component Summary (MCS); CLASI Disease Activity (CDA); CLASI Disease Damage (CDD); Disease Duration (DxD); Pain (PAIN); Pruritus/Itch (ITCH); Fatigue (FAT); Body Image (BIM); Comorbidity (COM); Side-effects from CLE Medications (SIDE); Pill Burden (PB); Skin Health Perception (SKH); Age (AGE); Income (INC); Social Support (SOS)

Note: Pearson's correlations are significant at *p < 0.05, **p < 0.01

5.7.2 T-tests

The predictor variables (binary level) used in the model were assessed to determine their relationships with each of the dependent variables. These predictor variables include: CLE subtype, depression, gender, race/ethnicity, smoking status, and marital status. None of the independent variables were significant with the CLEQoL mental and physical outcome variables [See Tables 5.31]. The findings from only the SF-36 analyses are thus presented below.

SF-36 Mental Component Summary (MCS)

The results from the analyses show that *MCS* scores ($t=3.021$, $df=55$, $p=0.004$; mean difference=9.30) in patients without depression (mean=48.62) were significantly higher than those with depression (mean=39.32). Therefore, the positive mean difference indicated that patients without depression had better mental health than did patients with depression [See Table 5.31].

SF-36 Physical Component Summary (PCS)

Race/ethnicity and smoking status were the only significant predictors of PCS. The t-test analyses from Table 5.31 show that the difference in PCS scores between those who were African-American/Black (mean=36.03) and Others (mean=44.59) was significant (mean difference=-8.56, $t=-2.673$, $df=55$, $p=0.010$). This difference in means shows that patients who were not African-American/Black had a higher PCS score (better physical health) than African-American/Black patients. Finally, the *PCS* scores ($t=-2.05$, $df=52$, $p=0.046$, mean difference=-7.01) was significantly higher for those

who had never smoked (mean=42.97) than patients who currently smoke/smoked cigarettes in the past (mean=35.97).

Table 5.31: T-tests of Predictor Variables with Dependent Variables (N=57)

	CLEQoL-Mental		CLEQoL-Physical		MCS		PCS	
	<i>t</i>	<i>p-value</i>	<i>t</i>	<i>p-value</i>	<i>t</i>	<i>p-value</i>	<i>t</i>	<i>p-value</i>
CLE subtype	1.11	0.272	0.18	0.859	-0.06	0.954	0.42	0.674
Depression	-1.61	0.114	-1.81	0.077	3.02	0.004**	0.63	0.534
Gender	-0.61	0.544	-0.24	0.810	-0.21	0.835	0.34	0.737
Race/Ethnicity	-0.22	0.829	0.03	0.978	0.05	0.962	-2.67	0.010**
Smoking	1.75	0.085	0.41	0.096	-1.45	0.152	-2.05	0.046*
Marital Status	0.55	0.582	0.16	0.409	0.62	0.540	-0.24	0.814

5.8 DESCRIPTIVES OF STUDY SCALES TOTAL

Table 5.32 provides a summary of the scale total scores calculated for each of the variables in the model.

Table 5.32: Summary of the Mean Scores, Standard Deviations, and Ranges of Study Scales

Scale	N	Mean	SD	Possible Range	Actual Range
CLEQoL					
Mental Domain	57	42.24	29.64	0 to 100	0 to 100.00
Emotions	57	42.24	29.64	0 to 100	0 to 100.00
Physical Domain	56	38.07	24.79	0 to 100	0.96 to 97.12
Symptoms	57	42.11	25.07	0 to 100	0 to 89.29
Functioning	57	27.96	28.52	0 to 100	0 to 100.00
Body image/cosmetic effects	56	42.41	28.99	0 to 100	0 to 100.00
Photosensitivity	56	61.90	30.44	0 to 100	0 to 100.00
SF-36					
Mental Component Summary (MCS)	55	45.68	11.56	0 to 100	17.24 to 65.25
Vitality (VT)	56	40.09	25.83	0 to 100	0 to 100.00
Social Functioning (SF)*	55	64.91	30.93	0 to 100	0 to 100.00
Role-Emotional (RE)	57	65.50	39.32	0 to 100	0 to 100.00
Mental Health (MH)	55	67.93	23.65	0 to 100	0 to 100.00
Physical Component Summary (PCS)	56	39.93	12.68	0 to 100	14.56 to 60.05
Physical Functioning (PF)	57	58.33	31.47	0 to 100	0 to 100.00
Role-Physical (RP)	56	43.42	44.70	0 to 100	0 to 100.00
Bodily Pain (BP)*	56	60.14	30.00	0 to 100	0 to 100.00
General Health (GH)	56	47.00	24.55	0 to 100	0 to 97.00
Disease activity	57	5.51	5.41	0 to 70.00	0 to 29.00
Disease damage	57	8.05	7.11	0 to 70.00	0 to 26.00

Table 5.32: Summary of the Mean Scores, Standard Deviations, and Ranges of Study Scales (Cont'd)

Scale	N	Mean	SD	Possible Range	Actual Range
Disease duration	57	7.12	8.45	-	0.10 to 39.96
Pain	57	3.16	3.46	0 to 10.00	0 to 10.00
Pruritus/Itch	55	3.78	3.39	0 to 10.00	0 to 10.00
Fatigue	55	5.18	3.57	0 to 10.00	0 to 10.00
Body image	57	8.78	8.92	0 to 30.00	0 to 30.00
Comorbidity	57	3.32	3.23	0 to 42.00	0 to 10.00
Side-effects from CLE medications	57	0.98	1.55	0 to 4.00	0 to 4.00
Pill burden	53	1.21	1.59	0 to 4.00	0 to 4.00
Skin health perception	57	5.14	3.02	0 to 10.00	0 to 10.00
Age	57	49.20	12.90	-	23.00 to 78.00
Social support	55	3.00	1.35	0 to 4.00	0 to 4.00

5.9 DATA SCREENING PRIOR TO ANALYSIS

Multicollinearity

To build the parsimonious model, multicollinearity was assessed between the seven interval-level variables (disease activity, pain, pruritus/itch, fatigue, body image, skin health perception, and social support), to determine if they were correlated with each other. Collinearity diagnostics were performed by examining the tolerance values (cut-off of <0.1) and variance inflation factor (cut-off of >10) between each pair of independent variables. None of the tolerance values were < 0.1 nor were any of the variance inflation factors > 10 . Given that multicollinearity was not a problem, all variables were utilized in building the parsimonious models for the regression analyses.

Assumptions Met

The assumptions of multiple regression analysis (normality of residuals, homoscedasticity, linearity, and independence) were checked before statistical analyses. Each of the dependent variables and their subscale/component scores were checked prior to statistical analyses. The distributions of the residuals based on the histograms of the residuals and normality probability plots were found to be normal.

Homoscedasticity was also assessed for each dependent variable and this assumption was met. The assumption of linearity was met based on the non-curved shape of the residual scatter plots of the dependent variables. Finally, the assumption of independence of residuals was met since participants received individual surveys (treatments) and responded individually to the survey within a short period of time [See Appendices J-L].

5.10 SUMMARY OF BIVARIATE ANALYSES

Table 5.33 details a summary of the bivariate analyses between each domain/subscale of the dependent variables and predictor variables. Only the significant predictor variables were retained for use in the parsimonious model.

Table 5.33: Summary of Significance of Results from Bivariate Analyses (All Predictor and Dependent Variables)

	CLEQOL-MENTAL	CLEQOL-PHYSICAL	SF-MCS	SF-PCS
Biological and Physiological Factors				
1. CLE subtype				
2. Disease activity	+	+		
3. Disease damage				
4. Disease duration				
Symptom Status				
5. Pain	+	+	-	-
6. Pruritus/Itch	+	+	-	-
7. Fatigue	+	+	-	-
Functioning				
8. Body image	+	+	-	-
9. Depression			+	
10. Comorbidity				
General Health Perceptions				
11. Side-effects from CLE medications				
12. Pill burden				
13. Skin health perception	-	-		-
Characteristics of the Individual				
14. Age	-			
15. Gender				
16. Race/ethnicity				-
17. Smoking status				-
Characteristics of the Environment				
18. Marital status				
19. Income				
20. Social support	-	-	-	



means significant at $p < 0.05$



means not significant

*Indicates a positive significant relationship

†Indicates a negative significant relationship

5.11 TESTS OF HYPOTHESES

Since none of the dependent variables violated the assumptions of multiple regression, there was no need for data transformation and rescaling. All of the dependent variables were normally distributed and there were no violations of skewness and kurtosis. To test the study hypotheses [See Chapter 4, Table 4.2], data analyses were conducted using t-tests, correlations, and multiple regression using parsimonious models built from bivariate analyses.

Objective 2: To determine the predictive ability of biological and physiological factors (disease activity), symptom status (pain, pruritus, or fatigue), functioning (body image), general health perception (skin health perception) in explaining overall quality of life (QoL) in patients with CLE while controlling for characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).

H_{2A}: Biological and physiological factors (disease activity), symptom status (pain, pruritus, or fatigue), functioning (body image), general health perception (skin health perception) will explain a significant amount of variance in overall QoL (CLEQoL and SF-36) while controlling for characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).

CLE-QoL-Mental as Dependent Variable

The CLEQoL-Mental regression model was significantly different from zero, $F=11.10$, $df=9,50$; $p<0.001$. Approximately 71 percent of the variation in overall QoL (mental) ($R^2=0.71$) was accounted for by nine predictor variables, where the adjusted R^2 was 65 percent ($R^2=0.65$). Therefore, H_{2A} was supported [See Table 5.34].

CLE-QoL-Physical as Dependent Variable

The CLEQoL-Physical regression model was significantly different from zero, $F=13.52$, $df=9,49$; $p<0.001$. Seventy-three percent of the variation in overall QoL (physical) ($R^2=0.73$) was accounted for by nine predictor variables, where the adjusted R^2 was 69 percent ($R^2=0.69$). Therefore, H_{2A} was supported [See Table 5.35].

SF-36 MCS as Dependent Variable

The SF-36 MCS regression model was significantly different from zero, $F=5.31$, $df=9, 50$; $p<0.001$. Nine predictor variables accounted for 54 percent of the variation in overall QoL (MCS) ($R^2=0.54$). The adjusted R^2 was 44 percent ($R^2=0.44$). Therefore, H_{2A} was supported [See Table 5.36].

SF-36 PCS as Dependent Variable

The SF-36 PCS regression model was significantly different from zero, $F=10.00$, $df=9, 50$; $p<0.001$. Nine predictor variables accounted for 69 percent of the variation in overall QoL (PCS) ($R^2=0.69$). The adjusted R^2 was 62 percent ($R^2=0.62$). Therefore, H_{2A} was supported [See Table 5.37]

H_{2B1}: Biological and physiological factor (disease activity) will be a *positive* and significant predictor of *overall QoL (CLEQoL)* while controlling for symptom status (pain, pruritus, or fatigue), functioning (body image), general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).

CLE-QoL-Mental as Dependent Variable

Disease activity was not a significant or positive predictor of *overall QoL (CLEQoL-Mental)* while controlling for other predictor variables ($\beta=-0.02$, $p=0.853$). Therefore, H_{2B1} was rejected [See Table 5.34].

CLE-QoL-Physical as Dependent Variable

Disease activity was not a significant or positive predictor of *overall QoL (CLEQoL-Physical)* while controlling for other predictor variables ($\beta=0.02$, $p=0.865$). Therefore, H_{2B1} was rejected [See Table 5.35].

H_{2B2}: Biological and physiological factor (disease activity) will be a *negative* and significant predictor of *overall QoL (SF-36)* while controlling for symptom status (pain, pruritus, or fatigue), functioning (body image), general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).

SF-36 MCS as Dependent Variable

Disease activity was not a positive and significant predictor of overall QoL (SF-36 MCS) ($\beta=0.04$, $p=0.760$) while controlling for other predictor variables. Therefore, H_{2B2} was rejected [See Table 5.36].

SF-36 PCS as Dependent Variables

Disease activity was not a positive and significant predictor of overall QoL (SF-36 PCS) ($\beta=0.03$, $p=0.742$) while controlling for other predictor variables. Therefore, H_{2B2} was rejected [See Table 5.37].

H_{2C1} : Symptom status (pain, pruritus, or fatigue), will be *positive* and significant predictor of *overall QoL (CLEQoL)* while controlling for biological and physiological factors (disease damage), functioning (body image) general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).

CLE-QoL-Mental as Dependent Variable

Fatigue was a positive and significant predictor of *overall QoL (CLEQoL-Mental)* while controlling for other predictor variables ($\beta=0.23$, $p=0.037$). Pain ($\beta=-0.10$, $p=0.522$) and pruritus/itch ($\beta=0.17$, $p=0.205$) were not significant predictors. Therefore, H_{2C1} was supported for fatigue and rejected for pain and pruritus/itch [See Table 5.34].

CLE-QoL-Physical as Dependent Variable

Fatigue was a positive and significant predictor of *overall QoL (CLEQoL-Physical)* while controlling for predictor variables ($\beta=0.31$, $p=0.013$). Pain ($\beta=-0.04$, $p=0.820$) and pruritus/itch ($\beta=0.18$, $p=0.185$) were not significant predictors. Therefore, H_{2C1} was supported for fatigue and rejected for pain and pruritus/itch [See Table 5.35].

H_{2C2} : Symptom status (pain, pruritus, or fatigue), will be a *negative* and significant predictor of *overall QoL (SF-36)* while controlling for biological and physiological factors (disease activity), functioning (body image), general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).

SF-36 MCS as Dependent Variable

Pruritus/itch ($\beta=-0.41$, $p=0.017$) and fatigue ($\beta=-0.29$, $p=0.042$) were negative and significant predictors of *overall QoL (SF-36 MCS)* while controlling for other predictor variables. Pain ($\beta=-0.14$, $p=0.491$) was not a significant predictor. Therefore, H_{2C2} was supported for pruritus/itch and fatigue, and rejected for pain [See Table 5.36].

SF-36 PCS as Dependent Variable

Pain ($\beta=-0.35$, $p=0.041$) and fatigue ($\beta=-0.47$, $p=0.000$) were negative and significant predictors of *overall QoL (SF-36 PCS)* while controlling for other predictor

variables. Pruritus/itch ($\beta=0.11$, $p=0.416$) was not a significant predictor. Therefore, H_{2C2} was supported for pain and fatigue, and rejected for pruritus/itch [See Table 5.37].

H_{2D1} : Functioning (body image) will be a *positive* and significant predictor of overall QoL (CLEQoL) while controlling for biological and physiological factors (disease activity), symptom status (pain, pruritus, or fatigue), general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).

CLE-QoL-Mental as Dependent Variable

Body image ($\beta=0.64$, $p=0.001$) was a positive and significant predictor of overall QoL (CLEQoL-Mental) while controlling for other predictor variables. Therefore, H_{2D1} was supported [See Table 5.34].

CLE-QoL-Physical as Dependent Variable

Body image ($\beta=0.49$, $p=0.002$) was a positive and significant predictor of overall QoL (CLEQoL-Physical) while controlling for other predictor variables. Therefore, H_{2D1} was supported [See Table 5.35].

H_{2D2} : Functioning (body image) will be a *negative* and significant predictor of overall QoL (SF-36) while controlling for biological and physiological factors (disease activity), symptom status (pain, pruritus, or fatigue), general health

perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).

SF-36 MCS as Dependent Variable

Body image ($\beta=0.22$, $p=0.224$) was not a negative and significant predictor of *overall QoL (SF-3 MCS)* while controlling for other predictor variables. Therefore, H_{2D2} was rejected [See Table 5.36].

SF-36 PCS as Dependent Variable

Body image ($\beta=-0.04$, $p=0.771$) was not a negative and significant predictor of *overall QoL (SF-36 PCS)* while controlling for other predictor variables. Therefore, H_{2D2} was rejected [See Table 5.37].

H_{2E1} : General health perception (skin health perception) will be a *negative* and significant predictor of *overall QoL (CLEQoL)* while controlling for biological and physiological factors (disease activity), symptom status (pain, pruritus, or fatigue), functioning (body image), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).

CLE-QoL-Mental as Dependent Variable

Skin health perception was not a negative and significant predictor of *overall QoL (CLEQoL-Mental)* while controlling for other predictor variables ($\beta=0.02$, $p=0.808$). Therefore, H_{2E1} was rejected [See Table 5.34].

CLE-QoL-Physical as Dependent Variable

Skin health perception was not a negative and significant predictor of *overall QoL (CLEQoL-Physical)* while controlling for other predictor variables ($\beta=0.02$, $p=0.839$). Therefore, H_{2E1} was rejected [See Table 5.35].

H_{2E2}: General health perception (skin health perception) will be a *negative* and significant predictor of *overall QoL (SF-36)* while controlling for biological and physiological factors (disease damage), symptom status (pain, pruritus, or fatigue), functioning (body image), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).

SF-36 MCS as Dependent Variable

Skin health perception ($\beta=0.05$, $p=0.710$) was not a negative and significant predictor of *overall QoL (SF-36 MCS)* while controlling for other predictor variables. Therefore, H_{2E2} was rejected [See Table 5.36].

SF-36 PCS as Dependent Variable

Skin health perception ($\beta=0.11$, $p=0.289$) was not a negative and significant predictor of *overall QoL (SF-36 PCS)* while controlling for other predictor variables. Therefore, H_{2C2} was rejected [See Table 5.37].

Table 5.34: Multiple Regression Analysis of Overall Quality of Life – CLE-QoL-Mental (N=50)

Variables	Unstandardized Coefficients		Standardized Coefficients	95.0% Confidence Interval ^a		P-values
	B	Std. Error	Beta	Lower Bound	Upper Bound	
Intercept	8.76	11.65		-14.75	32.30	0.45
<u>Independent Variables</u>						
<i>Biological and Physiological Factors</i>						
Disease Activity	-0.10	0.53	-0.02	-1.17	0.98	0.853
<i>Symptom Status</i>						
Pain	-0.89	1.38	-0.10	-3.68	1.90	0.522
Pruritus/Itch	1.48	1.15	0.17	-0.84	3.80	0.205
Fatigue	1.92	1.00	0.23	0.87	3.94	0.037*
<i>Functioning</i>						
Body Image	2.09	0.47	0.64	1.15	3.04	0.001**
<i>General Health Perception</i>						
Skin Health Perception	0.24	0.99	0.02	-1.76	2.24	0.808
<u>Covariates</u>						
<i>Characteristics of the Individual</i>						
Race/Ethnicity ^b	3.18	5.45	0.05	-7.85	14.21	0.564
Smoking status ^c	8.79	5.69	0.15	-2.70	20.27	0.130
<i>Characteristics of the Environment</i>						
Social Support	-1.36	2.35	-0.06	-6.11	3.38	0.565

F statistic =11.10; df=9, 50; Model p-value <0.001; R²=0.71; Adjusted R²=0.65

^aCI = confidence interval of unstandardized coefficients; *Indicates significance at p < 0.05; **Indicates significance at p < 0.01

^bRace/Ethnicity was dummy coded as “0” for “African-American/Black” and “1” for “Others,” with “African-American/Black” as the comparator.

^cSmoking Status was dummy coded as “0” for “Never smoker” and “1” for “Current/former smoker,” with “never smoker” as the comparator.

Table 5.35: Multiple Regression Analysis of Overall Quality of Life – CLE-QoL-Physical (N=49)

Variables	Unstandardized Coefficients		Standardized Coefficients	95.0% Confidence Interval ^a		P-values
	B	Std. Error	Beta	Lower Bound	Upper Bound	
Intercept	11.24	9.84		-8.64	31.12	0.260
<u>Independent Variables</u>						
<i>Biological and Physiological Factors</i>						
Disease Activity	0.08	0.45	0.02	-0.83	0.99	0.865
<i>Symptom Status</i>						
Pain	-0.27	1.18	-0.04	-2.65	2.11	0.820
Pruritus/Itch	1.31	0.97	0.18	-0.65	3.26	0.185
Fatigue	2.21	0.85	0.31	0.49	3.92	0.013*
<i>Functioning</i>						
Body Image	1.35	0.40	0.49	0.55	2.15	0.002**
<i>General Health Perception</i>						
Skin Health Perception	0.17	0.84	0.02	-1.52	1.86	0.839
<u>Covariates</u>						
<i>Characteristics of the Individual</i>						
Race/Ethnicity ^b	5.22	4.68	0.10	-4.23	14.67	0.271
Smoking Status ^c	6.83	4.83	0.13	-2.93	16.59	0.165
<i>Characteristics of the Environment</i>						
Social Support	-2.31	2.01	-0.12	-6.36	1.75	0.257
<i>F statistic =13.52; df=9, 49; Model p-value <0.001; R²=0.73; Adjusted R²=0.69</i>						

^aCI = confidence interval of unstandardized coefficients; *Indicates significance at p < 0.05; **Indicates significance at p < 0.01

^bRace/Ethnicity was dummy coded as "0" for "African-American/Black" and "1" for "Others," with "African-American/Black" as the comparator.

^cSmoking Status was dummy coded as "0" for "Never smoker" and "1" for "Current /former smoker," with "never smoker" as the comparator.

**Table 5.36: Multiple Regression Analysis of Overall Quality of Life – SF-36 Mental Component Summary (MCS)
(N=50)**

Variables	Unstandardized Coefficients		Standardized Coefficients	95.0% Confidence Interval ^a		P-values
	B	Std. Error	Beta	Lower Bound	Upper Bound	
Intercept	46.36	5.45		35.49	57.62	0.000
<u>Independent Variables</u>						
<i>Biological and Physiological Factors</i>						
Disease Activity	0.08	0.25	0.04	-0.43	0.58	0.760
<i>Symptom Status</i>						
Pain	-0.45	0.65	-0.14	-1.76	0.86	0.491
Pruritus/Itch	-1.35	0.54	-0.41	-2.44	-0.26	0.017*
Fatigue	-0.90	0.47	-0.29	-1.85	-0.15	0.042*
<i>Functioning</i>						
Body Image	0.27	0.22	0.22	-0.17	0.72	0.224
<i>General Health Perception</i>						
Skin Health Perception	0.17	0.47	0.05	-0.77	1.11	0.710
<u>Covariates</u>						
<i>Characteristics of the Individual</i>						
Race/Ethnicity ^b	-5.01	2.57	-0.23	-10.25	-0.11	0.048*
Smoking Status ^c	-1.53	2.67	-0.07	-6.92	3.87	0.569
<i>Characteristics of the Environment</i>						
Social Support	3.31	1.10	0.41	1.08	5.54	0.005**
<i>F statistic =5.31; df=9, 50; Model p-value <0.001; R²=0.54; Adjusted R²=0.44</i>						

^aCI = confidence interval of unstandardized coefficients; *Indicates significance at p < 0.05; **Indicates significance at p < 0.01

^bRace/Ethnicity was dummy coded as "0" for "African-American/Black" and "1" for "Others," with "African-American/Black" as the comparator.

^cSmoking Status was dummy coded as "0" for "Never smoker" and "1" for "Current /former smoker," with "never smoker" as the comparator.

Table 5.37: Multiple Regression Analysis of Overall Quality of Life – SF-36 Physical Component Summary (PCS) (N=50)

Variables	Unstandardized Coefficients		Standardized Coefficients	95.0% Confidence Interval ^a		P-values
	B	Std. Error	Beta	Lower Bound	Upper Bound	
Intercept	47.44	5.18		36.98	57.90	0.000
<u>Independent Variables</u>						
<i>Biological and Physiological Factors</i>						
Disease Activity	0.08	0.235	0.03	-0.40	0.56	0.742
<i>Symptom Status</i>						
Pain	-1.30	0.61	-0.35	-2.54	-0.06	0.041*
Pruritus/Itch	0.42	0.51	0.11	-0.61	1.45	0.416
Fatigue	-1.70	0.45	-0.47	-2.60	-0.80	0.000**
<i>Functioning</i>						
Body Image	-0.06	0.21	-0.04	-0.48	0.36	0.771
<i>General Health Perception</i>						
Skin Health Perception	0.47	0.44	0.11	-0.42	1.36	0.289
<u>Covariates</u>						
<i>Characteristics of the Individual</i>						
Race/Ethnicity ^b	4.61	2.43	0.18	0.30	9.51	0.045*
Smoking Status ^c	-3.46	2.53	-0.14	-8.57	1.64	0.178
<i>Characteristics of the Environment</i>						
Social Support	0.17	1.04	0.02	-1.94	2.28	0.870
<i>F statistic =10.00; df=9, 50; Model p-value <0.001; R²=0.69; Adjusted R²=0.62</i>						

^aCI = confidence interval of unstandardized coefficients; *Indicates significance at p < 0.05; **Indicates significance at p < 0.01

^bRace/Ethnicity was dummy coded as “0” for “African-American/Black” and “1” for “Others,” with “African-American/Black” as the comparator.

^cSmoking Status was dummy coded as “0” for “Never smoker” and “1” for “Current/former smoker,” with “never smoker” as the comparator.

Objective 3: To determine if symptom status (pain, pruritus, or fatigue) is related to biological and physiological factors (disease activity), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).

Bivariate analyses (t-test and correlations) were used to assess the hypotheses related to this objective. The results are described in Tables 5.38 – 5.41 below.

H_{3A1}: There is no association between biological and physiological factors (disease activity) and symptom status – pain.

Pain as the Outcome Variable

From Table 5.38, disease activity was positively and significantly associated with pain ($r=0.31$, $p<0.05$); as disease activity increased, so did pain. The hypothesis tested for objective 3 (H_{3A1}) was rejected.

H_{3A2}: There is no association between biological and physiological factors (disease activity) and symptom status - pruritus.

Pruritus/Itch as the Outcome Variable

Disease activity was positively and significantly associated with pruritus/itch ($r=0.35$, $p<0.01$). This means that as disease activity increased, pruritus increased. The hypothesis tested for objective 3 (H_{3A2}) was rejected [See Table 5.38].

H_{3A3}: There is no association between biological and physiological factors (disease activity) and symptom status - fatigue.

Fatigue as the Outcome Variable

There was no association between disease activity and fatigue ($r=0.14$, $p=0.331$).

Thus, the hypothesis tested for objective 3 (H_{3A3}) was supported [See Table 5.38].

Table 5.38: Correlations of Disease Activity with Symptom Status (N=57)

	Disease Activity	Pain	Pruritus/Itch	Fatigue
Disease Activity	1.00			
Pain	0.31 [*]	1.00		
Pruritus/Itch	0.35 ^{**}	0.72 ^{**}	1.00	
Fatigue	0.14	0.66 ^{**}	0.49 ^{**}	1.00

Note: Pearson's correlations are significant at * $p < 0.05$, ** $p < 0.01$

H_{3B1} – H_{3B3}: There is no association between characteristics of the individual (race/ethnicity, smoking status) and symptom status (pain, pruritus, fatigue).

Race/ethnicity as the Predictor Variable

A t-test was used to assess the relationship between race/ethnicity and symptom status (pain). The differences in mean symptom scores (pain, pruritus, and fatigue) between the two groups (“African-American/Black” and “others”) were not statistically significant [See Table 5.39]. The hypotheses tested for objective 3 (H_{3B1} – H_{3B3}) were thus accepted.

Table 5.39: T-tests of Race/Ethnicity^a with Symptom Status Variables (N=57)

	Mean for AA/B group (SD) (N)	Mean for Others group (SD) (N)	t-test ^b (p-value)
Pain	3.68 3.71 31	2.31 3.02 26	1.51 (0.137)
Pruritus/Itch	4.06 3.83 31	3.50 2.94 26	0.61 (0.541)
Fatigue	5.55 3.78 31	4.71 3.30 24	0.86 (0.392)

^aRace/Ethnicity was collapsed into two categories: African-American/Black (AA/B) and Others (Caucasian, Hispanic, Asian, and Other)

^bFor t-test equality of means, equal variance assumed (The Levene test for equality of variance: $p>0.05$)

Smoking Status as the Predictor Variable

The differences in mean symptom scores between the two groups (“Current/former smoker” and “never smoker”) were statistically significant for pain ($t=2.13$, $df=52$, $p<0.05$) and pruritus/itch ($t=2.09$, $df=52$, $p<0.05$) [See Table 5.40]. This means that patients who were current/former smokers experienced higher symptom levels (pain and pruritus/itch) than those who had never smoked. The hypotheses for objectives H_{3B1} - H_{3B2} were not rejected. However, the hypothesis for H_{3B3} was accepted as fatigue did not have any association with smoking status.

Table 5.40: T-tests of Smoking Status with Symptom Status Variables (N=57)

	Mean for Current/Former Smoker (SD) (N)	Mean for Never Smoker (SD) (N)	t-test ^a (p-value)
Pain	4.16 3.61 25	2.21 3.13 29	2.13 (0.038 [*])
Pruritus/Itch	4.88 3.36 25	3.03 3.41 29	2.09 (0.041 [*])
Fatigue	5.67 3.50 24	4.93 3.56 28	0.75 (0.458)

^aSmoking status was collapsed into two categories: Current/former smoker and never smoker

^bFor t-test equality of means, equal variance assumed (The Levene test for equality of variance: $p > 0.05$)

*Asterisk indicates statistical significance at $p < 0.05$

H_{3C1} – H_{3C3}: There is no association between characteristics of the environment (social support) and symptom status (pain, pruritus, fatigue).

Social Support as the Predictor Variable

There was no significant relationship among pain ($r = -0.17$, $p = 0.213$), pruritus/itch ($r = -0.22$, $p = 0.115$), fatigue ($r = 0.01$, $p = 0.952$) and social support. The hypotheses tested for objective 3 (H_{3C1} – H_{3C3}) were supported [See Table 5.41].

Table 5.41: Correlations of Social Support with Symptom Status (N=57)

	Social Support	Pain	Pruritus/Itch	Fatigue
Support	1.00			
Pain	-0.17	1.00		
Pruritus/Itch	-0.22	0.72 ^{**}	1.00	
Fatigue	-0.01	0.66 ^{**}	0.49 ^{**}	1.00

Note: Pearson's correlations are significant at * $p < 0.05$, ** $p < 0.01$

Objective 4: To determine if functioning (body image) is related to symptom status (pain, pruritus, or fatigue), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).

Multiple regression was used to assess the related hypotheses of this objective. The results are described in Table 5.42 below. The functioning regression model was significantly different from zero, $F=10.96$; $df=6,50$; $p<0.001$. Sixty percent of the variation in functioning (body image) ($R^2=0.60$) was accounted for by the six independent variables, where the adjusted R^2 was 54 percent ($R^2=0.54$).

H_{4A1} – H_{4A3}: There is no association between symptom status (pain, pruritus, or fatigue) and functioning (body image).

The hypotheses, H_{4A1} and H_{4A3}, were rejected for pain ($\beta=0.42$, $p=0.018$) and fatigue ($\beta=0.27$, $p=0.043$), respectively [See Table 5.42]. However, the H_{4A2} was accepted as pruritus/itch had no association with functioning ($\beta=0.00$, $p=0.985$). Therefore, the hypotheses were rejected for pain and fatigue, and accepted for pruritus/itch [See Table 5.42].

H_{4B1} – H_{4B2}: There is no association between characteristics of the individual (race/ethnicity, smoking status) and functioning (body image).

This hypothesis was rejected for race/ethnicity ($\beta=0.20$, $p=0.047$) [See Table 5.42]. This statistical result suggests that there is a significant relationship between race/ethnicity and functioning. However, the hypothesis for smoking status was accepted as there was no relationship between smoking status and body image ($\beta=-0.05$,

p=0.658). Therefore, H_{4B1} was rejected for race/ethnicity and H_{4B2} was accepted for smoking status [See Table 5.42].

H_{4C}: There is no association between characteristics of the environment (social support) and functioning (body image).

From Table 5.42, social support was negatively and significantly associated with body image (β =-0.45, p=0.000). Therefore, H_{4C} was rejected.

Table 5.42: Multiple Regression Analysis of Functioning (Body Image) (N=51)

Variables	Unstandardized Coefficients		Standardized Coefficients	95.0% Confidence Interval ^a		P-values
	B	Std. Error	Beta	Lower Bound	Upper Bound	
Intercept	9.76	2.76		4.02	15.13	0.001
Independent Variables						
<i>Symptom Status</i>						
Pain	1.10	0.45	0.42	0.20	2.00	0.018*
Pruritus/Itch	0.07	0.39	0.00	-0.77	0.79	0.985
Fatigue	0.69	0.33	0.27	0.02	1.35	0.043*
Covariates						
<i>Characteristics of the Individual</i>						
Race/Ethnicity ^b	3.69	1.80	0.20	0.05	7.33	0.047*
Smoking Status ^c	-0.81	1.82	-0.05	-4.49	2.86	0.658
<i>Characteristics of the Environment</i>						
Social Support	-2.98	0.68	-0.45	-4.34	-1.62	0.000**
<i>F statistic =10.96; df=6, 50; Model p-value <0.001; R²=0.60; Adjusted R²=0.54</i>						

^aCI = confidence interval of unstandardized coefficients; *Indicates significance at p < 0.05; **Indicates significance at p < 0.01

^bRace/Ethnicity was dummy coded as "0" for "African-American/Black" and "1" for "Others," with "African-American/Black" as the comparator.

^cSmoking Status was dummy coded as "0" for "Never smoker" and "1" for "Current/former smoker," with "never smoker" as the comparator.

Objective 5: To determine if general health perception (skin health perception) is related to functioning (body image), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).

The results from the multiple regression are described in Table 5.43 below. The regression model was significantly different from zero, $F=3.25$; $df=4,51$; $p<0.05$. Twenty-two percent of the variation in general health perception (skin health perception) ($R^2=0.22$) was accounted for by the six independent variables, where the adjusted R^2 was 14 percent ($R^2=0.15$).

H_{5A}: There is no association between functioning (body image) and general health perception (skin health perception).

This hypothesis (H_{5A}) was rejected as the statistical result suggests that there is a significant and negative relationship between functioning and skin health perception ($\beta=-0.43$, $p=0.005$) [See Table 5.43].

H_{5B1} – H_{5B2}: There is no association between characteristics of the individual (race/ethnicity, smoking status) and general health perception (skin health perception).

There was no relationship between race/ethnicity and skin health perception ($\beta=-0.05$, $p=0.700$). Also, there was no significant difference between smoking and skin health perception ($\beta=-0.13$, $p = 0.324$). The hypotheses tested for objective 5 (H_{5B1} – H_{5B2}) were accepted [See Table 5.43].

H_{5C}: There is no association between characteristics of the environment (social support) and general health perception (skin health perception).

This hypothesis was accepted as there was no relationship between social support and skin health perception ($\beta=0.01$, $p=0.963$) [See Table 5.43].

Table 5.43: Multiple Regression Analysis of General Health Perception (Skin Health Perception) (N=51)

Variables	Unstandardized Coefficients		Standardized Coefficients	95.0% Confidence Interval ^a		P-values
	B	Std. Error	Beta	Lower Bound	Upper Bound	
Intercept	5.41	1.94		1.51	9.31	0.008
<u>Independent Variables</u>						
<i>Functioning</i>						
Body Image	-0.14	0.05	-0.43	-0.24	-0.05	0.005**
<u>Covariates</u>						
<i>Characteristics of the Individual</i>						
Race/Ethnicity ^b	-0.31	0.81	-0.05	-1.94	1.31	0.700
Smoking Status ^c	0.79	0.79	0.13	-0.81	2.39	0.324
<i>Characteristics of the Environment</i>						
Social Support	0.02	0.33	0.01	-0.65	0.68	0.963
<i>F statistic =3.25; df=4, 51; Model p-value <0.05; R²=0.22; Adjusted R²=0.15</i>						

^aCI = confidence interval of unstandardized coefficients; *Indicates significance at $p < 0.05$; **Indicates significance at $p < 0.01$

^bRace/Ethnicity was dummy coded as "0" for "African-American/Black" and "1" for "Others," with "African-American/Black" as the comparator.

^cSmoking Status was dummy coded as "0" for "Never smoker" and "1" for "Current/former smoker," with "never smoker" as the comparator.

Objective 6: To compare the predictive ability of each of the two models (Model 1 – CLEQoL and Model 2 – SF-36), in patients with CLE according to the proposed theoretical framework of the Revised Wilson and Cleary Model.

H_{6A}: The model with CLEQoL (Model 1) as the dependent variable will have a higher predictive ability than the model with SF-36 (Model 2), using the Williams's t-tests:

$$t_{n-3} = (r_{12} - r_{13}) \sqrt{\frac{(n-1)(1+r_{23})}{2\left(\frac{n-1}{n-3}\right)|R| + \frac{(r_{12}+r_{13})^2}{4}(1-r_{23})^3}}$$

$$\text{where } |R| = 1 - r_{12}^2 - r_{13}^2 - r_{23}^2 + 2r_{12}r_{13}r_{23}$$

To compare the regression models, correlations from the regression outputs [See Table 5.44] were input into the equation above. Plugging the appropriate correlation values into the equation yielded the results displayed in Table 5.45. These results indicate that the difference between the two correlated correlations is statistically significant between the two models. Because the statistical t-test was higher than the critical t-test, the H₀ was accepted; the predictor set has a better fit for higher R² groups, i.e., CLEQoL mental has a better fit than the MCS model and CLEQoL physical has a better fit than the PCS model. Summarily, the CLEQoL models – mental and physical had higher predictive ability than the SF-36 models – MCS and PCS, respectively.

Table 5.44: Pearson's Correlations for the Four Multiple Regression Models

	CLEQoL Mental	CLEQoL Mental (Predicted)	MCS	MCS (Predicted)	CLEQoL Physical	CLEQoL Physical (Predicted)	PCS	PCS (Predicted)
CLEQoL Mental	1	0.83**	-0.59**	-0.25	0.91**	0.83**	-0.40**	-0.59**
CLEQoL Mental (Predicted)	0.83**	1	-0.51**	-0.31*	0.85**	0.99**	-0.60**	-0.73**
MCS	-0.59**	-0.51**	1	0.33*	-0.55**	-0.56**	0.29*	0.48**
MCS (Predicted)	-0.25	-0.31*	0.33*	1	-0.30*	-0.36**	0.40**	0.49**
CLEQoL Physical	0.91**	0.85**	-0.55**	-0.30*	1	0.85**	-0.52**	-0.67**
CLEQoL Physical (Predicted)	0.83**	0.99**	-0.56**	-0.36**	0.85**	1	-0.63**	-0.77**
PCS	-0.40**	-0.60**	0.29*	0.40**	-0.52**	-0.63**	1	0.83**
PCS (Predicted)	-0.59**	-0.73**	0.48**	0.49**	-0.67**	-0.77**	0.83**	1

Physical Component Summary (PCS); Mental Component Summary (MCS)

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed)

Table 5.45: Williams' *t*-Test For Comparing Two Nonindependent Correlations With Common Variables

	r_{12}	r_{13}	r_{23}	N	Statistical <i>t</i>	df	1-tailed α	Critical <i>t</i>
CLEQoL Mental and MCS models	0.83	0.25	0.31	57	5.969	54	0.05	1.67
CLEQoL Physical and PCS models	0.85	0.67	0.77	57	3.772	54	0.05	1.674

5.12 SUMMARY OF TESTS OF HYPOTHESES

Table 5.46 shows the summary of the hypotheses test results. Twenty-four of the 43 hypotheses (56%) were supported via the study objectives [See Table 5.46].

Table 5.46: Summary of Hypotheses Test Results

Hypotheses	CLEQoL – Mental	CLEQoL – Physical	SF-36 MCS	SF-36 PCS
Objective 2: To determine the predictive ability of biological and physiological factors (disease activity), symptom status (pain, pruritus, or fatigue), functioning (body image), general health perception (skin health perception) in explaining overall quality of life (QoL) in patients with CLE while controlling for characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).				
H_{2A}: Biological and physiological factors (disease activity), symptom status (pain, pruritus, or fatigue), functioning (body image), general health perception (skin health perception) will explain a significant amount of variance in overall QoL (CLEQoL and SF-36) while controlling for characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).	Supported	Supported	Supported	Supported
H_{2B1}: Biological and physiological factor (disease activity) will be a <i>positive</i> and significant predictor of <i>overall QoL (CLEQoL)</i> while controlling for symptom status (pain, pruritus, or fatigue), functioning (body image), general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).	Not Supported	Not Supported	N/A	N/A
H_{2B2}: Biological and physiological factors (disease activity) will be a <i>negative</i> and significant predictors of <i>overall QoL (SF-36)</i> while controlling for symptom status (pain, pruritus, or fatigue), functioning (body image), general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).	N/A	N/A	Not Supported	Not Supported
H_{2C1}: Symptom status (pain, pruritus, or fatigue), will be a <i>positive</i> and significant predictor of <i>overall QoL (CLEQoL)</i> while controlling for biological and physiological factors (disease activity), functioning (body image) general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).	Supported (Fatigue)	Supported (Fatigue)	N/A	N/A

Table 5.46: Summary of Hypotheses Test Results (Cont'd)

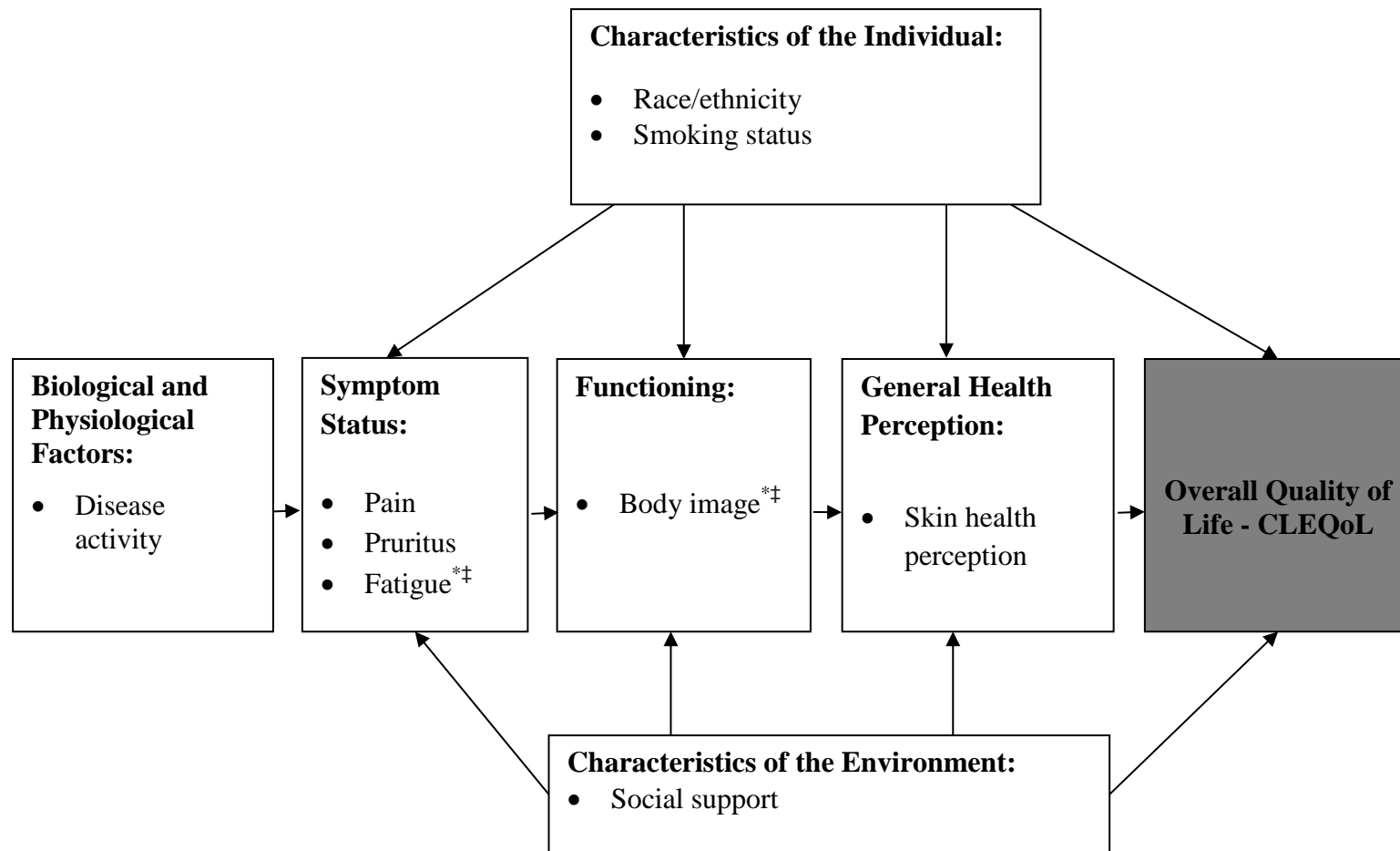
Hypotheses	CLEQoL – Mental	CLEQoL – Physical	SF-36 MCS	SF-36 PCS
H_{2C2}: Symptom status (pain, pruritus, or fatigue), will be a <i>negative</i> and significant predictors of <i>overall QoL (SF-36)</i> while controlling for biological and physiological factors (disease activity), functioning (body image), general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).	N/A	N/A	Supported (pruritus, fatigue)	Supported (pain, fatigue)
H_{2D1}: Functioning (body image) will be a <i>positive</i> and significant predictor of <i>overall QoL (CLEQoL)</i> while controlling for biological and physiological factors (disease activity), symptom status (pain, pruritus, or fatigue), general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).	Supported	Supported	N/A	N/A
H_{2D2}: Functioning (body image) will be a <i>negative</i> and significant predictor of <i>overall QoL (SF-36)</i> while controlling for biological and physiological factors (disease activity), symptom status (pain, pruritus, or fatigue), general health perception (skin health perception), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).	N/A	N/A	Not Supported	Not Supported
H_{2E1}: General health perception (skin health perception) will be <i>negative</i> and significant predictors of <i>overall QoL (CLEQoL)</i> while controlling for biological and physiological factors (disease damage), symptom status (pain, pruritus, or fatigue), functioning (body image), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).	Not Supported	Not Supported	N/A	N/A
H_{2E2}: General health perception (skin health perception) will be <i>negative</i> and significant predictors of <i>overall QoL (SF-36)</i> while controlling for biological and physiological factors (disease damage), symptom status (pain, pruritus, or fatigue), functioning (body image), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).	N/A	N/A	Not Supported	Not Supported

Table 5.46: Summary of Hypotheses Test Results (Cont'd)

Objective 3: To determine if symptom status (pain, pruritus, or fatigue) is related to biological and physiological factors (disease activity), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).		
H_{3A1}: There is no association between biological and physiological factors (disease activity) and symptom status (pain).	Not supported	
H_{3A2}: There is no association between biological and physiological factors (disease activity) and symptom status (pruritus).	Not supported	
H_{3A3}: There is no association between biological and physiological factors (disease activity) and symptom status (fatigue).	Supported	
	Race/Ethnicity	Smoking
H_{3B1}: There is no association between characteristics of the individual (race/ethnicity, smoking status) and symptom status (pain).	Supported	Not supported
H_{3B2}: There is no association between characteristics of the individual (race/ethnicity, smoking status) and symptom status (pruritus).	Supported	Not supported
H_{3B3}: There is no association between characteristics of the individual (race/ethnicity, smoking status) and symptom status - fatigue.	Supported	Supported
H_{3C1}: There is no association between characteristics of the environment (social support) and symptom status (pain).	Supported	
H_{3C2}: There is no association between characteristics of the environment (social support) and symptom status (pruritus).	Supported	
H_{3C3}: There is no association between characteristics of the environment (social support) and symptom status (fatigue).	Supported	
Objective 4: To determine if functioning (body image) is related to symptom status (pain, pruritus, or fatigue), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).		
H_{4A1}: There is no association between symptom status – pain and functioning (body image).	Not supported	
H_{4A2}: There is no association between symptom status – pruritus and functioning (body image).	Supported	
H_{4A3}: There is no association between symptom status – fatigue and functioning (body image).	Not supported	
H_{4B1}: There is no association between characteristics of the individual (race/ethnicity) and functioning (body image).	Not supported	
H_{4B2}: There is no association between characteristics of the individual (smoking status) and functioning (body image).	Supported	
H_{4C}: There is no association between characteristics of the environment (social support) and functioning (body image).	Not supported	

Table 5.46: Summary of Hypotheses Test Results (Cont'd)

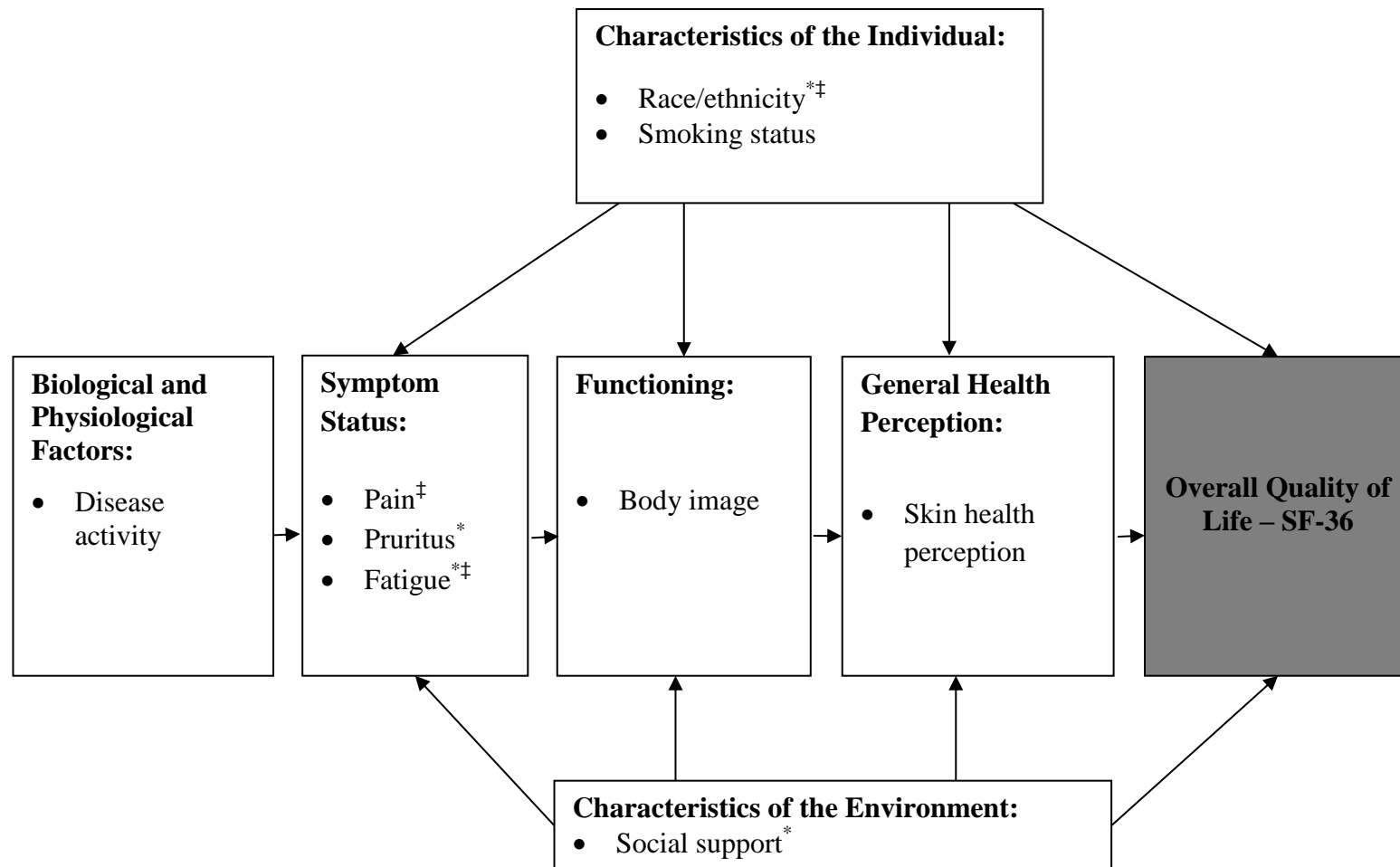
Objective 5: To determine if general health perception (skin health perception) is related to functioning (body image), characteristics of the individual (race/ethnicity, smoking status) and characteristics of the environment (social support).	
H_{5A}: There is no association between functioning (body image) and general health perception (skin health perception).	Not supported
H_{5B1}: There is no association between characteristics of the individual (race/ethnicity) and general health perception (skin health perception).	Supported
H_{5B2}: There is no association between characteristics of the individual (smoking status) and general health perception (skin health perception).	Supported
H_{5C}: There is no association between characteristics of the environment (social support) and general health perception (skin health perception).	Supported
Objective 6: To compare the predictive ability of each of the two models (Model 1 – CLEQoL and Model 2 – SF-36), in patients with CLE according to the proposed theoretical framework of the Revised Wilson and Cleary Model.	
H_{6A}: The model with CLEQoL (Model 1) as the dependent variable will have a higher predictive ability than the model with SF-36 (Model 2), using Williams's <i>t</i> -tests.	Supported



* Indicates significant relationship with CLEQoL- Mental

‡ Indicates significant relationship with CLEQoL- Physical

Figure 5.2: Conceptual Model Showing Significant Relationships with Overall QoL – CLEQoL



* Indicates significant relationship with SF-36 MCS

† Indicates significant relationship with SF-36 PCS

Figure 5.3: Conceptual Model Showing Significant Relationships with Overall QoL – SF-36

CHAPTER SIX: DISCUSSION AND CONCLUSIONS

This chapter provides a discussion of the study results. This study examined the predictive ability of constructs from the Revised Wilson and Cleary model in understanding the overall QoL of life in patients with CLE. This chapter begins with a review of the research question and study objectives/hypotheses followed by a discussion of the focus group findings. After which, the study sample, as well as the study findings were discussed and compared with previous research. The last part of this chapter evaluates the study model and presents discussions on the study implications, future research, study limitations, and conclusions.

6.1 REVIEW OF RESEARCH QUESTIONS

CLE, like most dermatological disease, is recognized for its detrimental impact on the quality of life (QoL) in patients by exerting significant burden on patients themselves and disrupting the lives of loved ones and individuals closest to them.^{21,73,74} Unlike other dermatologic diseases, CLE is considered to be one of the most debilitating, causing both industrial disability and vocational handicap in patients.^{30,36} Further, some of the symptoms experienced by CLE patients are subjective,^{21,55,76} and may not be captured accurately by clinical assessment tools. As a result, subjective measures, such as patient-reported outcomes (PROs) are needed to accurately measure QoL in these patients. Studies that have assessed QoL in CLE patients make use of PRO measures that were not specifically developed for these patients and that do not have reported psychometric properties.^{20,21,26,55,73,74,160,262} As a result, it is possible that all the

important issues relevant to CLE patients may not be captured. By using specific PRO measures, we can identify what factors make up the QoL in CLE patients. Consequently, these factors, especially the modifiable ones, can be targeted to improve the QoL of patients. Further, the development and validation of CLE-specific PRO measures can be used to create CLE-specific attributes that could be used in determining therapeutic efficacy in future clinical trials. Hence, this current study fills these gaps as there are no known studies that have specifically examined the factors contributing to the QoL in patients by using a disease-specific PRO and a theoretical framework.

6.2 FOCUS GROUP (FG) FINDINGS

FGs were conducted to explore, describe and clarify the patients' perspective of how CLE has impacted their lives, and to examine patients' perceptions of unmet needs regarding CLE treatment and care. While confirming CLE's negative impact on QoL,^{21,26,314} findings from the FGs delineate physical, mental, and medication effects from CLE, CLE's impact on social interactions, coping strategies, and unmet needs regarding their treatment and management.

The physical limitations imposed upon patients by CLE can be disruptive and problematic.^{20,21,236} Itching and other skin symptoms such as burning and photosensitivity can affect one's ability to engage in daily activities, and affect their social interactions. Providers can help alleviate these symptoms with appropriate medications and counseling on photoprotective methods to help offset these issues.

Moreover, our FGs elicited strong sentiment about the negative QoL impact of permanent alterations in physical appearance including scarring and dyspigmentation that cause significant body image issues – which were the most unique contributions to the literature.^{10,315} Patients employed grooming practices to cover their skin blemishes with long-sleeved clothing, heavy makeup, and wigs. The importance of these practices was further underscored by multiple patients wishing they received education on masking their skin blemishes earlier. Despite these concerns, current QoL instruments used for CLE clinical trials such as the Skindex and Dermatology Life Quality Index,³¹⁶⁻³¹⁸ do not sufficiently evaluate the impact of these unique features of CLE. Adding questions to probe the extent to which patients cover their CLE lesions and alter their outdoor practices would help address this deficiency.

Like other chronic diseases such as multiple sclerosis³¹⁹ and SLE,³²⁰ CLE confers social difficulties on patients. Due to the unpredictability of the disease, patients find it hard to sometimes foster interactions with those around them. Providers can seek out behaviors suggestive of social isolation by asking patients about preference to stay home or do things alone because of their CLE. By retreating and isolating themselves, patients may be at a greater risk of worsening their mental health. Several patients expressed frustrations about how CLE is often perceived by others as less severe because it is skin-related with mostly subjective signs and symptoms. Educating the public about CLE is key to creating the awareness needed to understand the disease better and to provide the needed support and empathy to patients with CLE.

Positive and negative coping strategies were cited by several patients with CLE. Having strong support systems through friends and family was fortunately shared by many patients. Patients (especially newly-diagnosed ones) who receive psychosocial supports have fared better with their disease management and participate more in their healthcare.^{321,322} Furthermore, anecdotal comments made by FG participants showed that patients valued being with other patients with CLE and the safe environment to share information related to their concerns, needs, and experiences. Many patients reported that the FGs helped normalize their QoL issues related to CLE. These FGs validated the importance of patient support systems, which can reduce feelings of isolation, anxiety, and depression and promote better overall mental health in patients with CLE. The ability to self-manage the symptoms experienced in chronic, disabling diseases (such as CLE) is important to reduce the impact of the disease on QoL.³²³ In addition, coping has been reported to be an important mediator in the ability of adults to achieve a reasonable well-being.^{324,325}

CLE patients also strongly expressed a desire for medications to improve not only acute symptoms such as itching and burning but also chronic skin sequelae including scarring, dyspigmentation, and alopecia. Clinical trials in lupus patients often use improvement in CLASI activity scores, which results in reduction of acute symptoms (e.g. itching, burning), as a primary outcome measure. However, they often do not report changes in CLASI damage scores that measure amount of scarring and dyspigmentation.^{316,326,327} This limitation underscores the need to develop therapeutic

agents in CLE that alleviate both acute and chronic skin sequelae in CLE, which would be more likely viewed as therapeutic success by patients.

6.3 REVISED WILSON & CLEARY STUDY FINDINGS

Overall QoL was the main outcome variable of the study. In the Revised Wilson and Clearly Model, QoL is determined by biological and physiological factors, symptoms status, functioning, general health perception, and characteristics of the individual and environmental characteristics.

6.3.1 Overall Quality of Life

In this study, overall QoL was operationalized using two measures – a disease-specific instrument, CLEQoL and a generic instrument – Short Form (SF)-36.

6.3.1.1 CLEQoL

Overall, patients experienced all of the domains in the CLEQoL rarely or some of the time. Of all the initial five domains of the CLEQoL, CLE patients were most affected in the lupus-specific domains – photosensitivity and body image/cosmetic effects and were least affected in the functioning domain; these all fall under the CLEQoL-physical domain. While the body/image cosmetic effects domain is a unique contribution to the literature, other studies have reported similar findings with the photosensitivity and functioning domains.^{21,22,26}

Within the photosensitivity domain, patients were most concerned with the effect of the sun on their protection efforts and the effect of sun flares. These physical limitations imposed upon patients by CLE can be disruptive and problematic, which is consistent with findings from other studies.^{20,21,236} Specifically, photosensitivity can affect patient's ability to engage in daily activities, and affect their social interactions. Providers can help alleviate these symptoms with appropriate medications and counseling on photoprotective methods to help offset these issues. Moreover, CLE results in permanent alterations in physical appearance including scarring and dyspigmentation that cause significant body image issues.^{10,315}

Within the body image/cosmetic issue domains, patients were most concerned with losing their hair, which is consistent with findings from another study.²³⁶ For patients with chronic diseases, such as CLE, alterations in physical appearance as a result of the disease course may cause significant body image issues.^{10,315} For female patients especially the younger ones, these cosmetic issues can be a major problem and can impact their ability to cope with the disease. Rather than expose the physical manifestations of their disease, many patients (especially females) resort to the use of extra clothing, heavy makeup, and wigs to cover up. Some of these cover-up measures are used all year round and may not be convenient during hot and sunny times of the year. For patients with CLE, possessing a positive self-concept (such as positive attitude and presence of family support) may assist with body image issues experienced. Patients can also be equipped with adequate social skills, as part of psychosocial interventions, which may be helpful when addressing comments or looks from others.³²⁸

When combined into two domains, patients in this current study were most severely affected in the mental domain, which is similar to findings in patients with other skin diseases.²³⁶

In this CLEQoL model (both physical and mental), after controlling for all the predictor variables, symptoms status (fatigue) and functioning (body image) showed positive and significant relationships with overall QoL.

6.3.1.2 SF-36

As expected, CLE patients reported significantly lower quality of life than the U.S. general population, both on the physical (PCS) and mental component summary scores (MCS). CLE patients scored lowest on questions related to role-physical from the PCS domain and vitality from the MCS domain. These low scores on the PCS domain are similar to findings in patients with clinical depression and recent myocardial infarction, and worse than patients with hypertension.²³⁶ Similarly, the low scores reported on the MCS domain were similar to those with congestive heart failure and clinical depression, and worse in patients with type 2 diabetes mellitus and in those with a recent myocardial infarction.²³⁶

The physical functioning and bodily pain scores were moderate, which indicates some limitation in physical functioning and some disability and reduction in physical well-being due to body pain, respectively. This finding from the bodily pain scores are supported by the mild levels of pain reported by patients on the pain NRS. The poor scores on role-physical suggest that patients experienced considerable role-disability

due largely with their physical health. Of particular note were the very low vitality and general health scores, relative to those seen in the U.S. population. The low scores on vitality could be related to the low ratings on fatigue scores among patients in this current study.

In this SF-36 MCS model, after controlling for all the predictor variables, symptom status (pruritus/itch and fatigue), characteristics of the individual (race/ethnicity), and characteristics of the environment (social support) showed significant relationships with overall QoL. For the SF-36 PCS model, pain and fatigue (measures of symptom status) and race/ethnicity were predictors of overall QoL.

6.3.2 Evaluation of the Study Model of Overall QoL

The hypotheses that the study models would predict significant amounts of variance in overall QoL were supported by the data. In the two CLEQoL models – mental and physical, the combination of fatigue and body image explained 71.0 and 73.0 percent of the variance in overall QoL, respectively.

Both the MCS and PCS models from SF-36 accounted for significant amount of variances too, 54.0 and 69.0 percent, respectively. In the MCS model, the large variance in overall QoL was largely due to the contribution of pruritus/itch, fatigue, race/ethnicity, and social support. While pain, fatigue, and race/ethnicity contributed to the variance in overall QoL from the PCS model.

To put these explained variances (R^2) in perspective, a review of articles utilizing the Revised Wilson & Cleary model depicted a wide range of explained

variance in overall QoL, from a low of 10 percent to a high of 61 percent.^{214,220,235,329,330}

In this study, the explained variances, ranging from 54 – 73 percent, were slightly higher than the averages described in the Revised Wilson and Cleary Model. Nonetheless, in terms of examining overall QoL in patients with CLE, the Revised Wilson and Cleary Model appears to be theoretically sound and has some practical utility.

6.3.3 Factors Associated with Overall QoL

Of all nine predictor variables, corresponding to six constructs included in the four regression models, a total of six predictor variables (from four constructs) were significant with overall QoL. The findings from each of the constructs are described below.

6.3.3.1 Symptom Status

Pain, pruritus/itch, and fatigue served as the proxies for symptom status in this study. These three variables were significantly related to overall QoL, and related hypotheses were supported across the four regression models, collectively.

6.3.3.1.1 Pain

From the SF-36 PCS model, pain was negatively associated with overall QoL, meaning that patients that reported high levels of pain had poor physical health scores. This inverse relationship between increasing pain and lower QoL in CLE

patients have been reported in other studies.^{55,331} In other disease conditions, such as fibromyalgia, back pain, and arthritis, pain has been reported to have varying relationships with QoL.³³²⁻³³⁴ Plausible explanations for these contrary findings could be due to the lack of specificity in the QoL measure or also because of the way ‘pain’ was operationalized in these studies. Rather than measuring the intensity of pain on a spectrum, most of these studies measured the absence or presence of pain. Thus, it is important to measure pain experiences across a spectrum so as to understand the effect of pain on QoL.

The physical limitations imposed upon patients by CLE can be very disruptive and problematic. These limitations can impair functionality, especially when pain is present.^{55,331} As a modifiable factor, pain can be targeted by interventions aimed at improving the QoL in patients with CLE, especially given its impact on physical health. Further, pain or inadequate pain management has been consistently cited as a factor associated with QoL in several studies.³³⁵⁻³³⁹

6.3.3.1.1 *Factors Associated with Pain*

Disease activity and smoking status were positively associated with pain. In a recent study conducted by Mendez-Flores, Orozco-Topete, Bermudez-Bermejo, & Hernandez-Molina,⁵⁵ pain was also found to be positively correlated with CLASI activity scores; thus, corroborating the findings from our current study. In conclusion, pain is a self-reported outcome associated with disease activity; therefore, treatment

targeted at improving disease activity in CLE patients could consider focusing on pain management as well.

This study also demonstrated an association between current/former smokers and symptoms – pain, a relationship that has not been well established in previous studies in CLE patients.^{21,67} However, an unpublished article conducted in DLE patients reported that in addition to having poorer QoL, current smokers experienced increased CLE symptoms, such as pain.³⁷ Exposure to cigarette smoke has been reported to activate tissue-damaging and inflammatory factors, such as matrix metalloproteinase activity, leading to pain.^{340,341} This current study's findings on the relationship between positive smoking status and increasing pain levels highlights the importance of understanding self-reported pain in CLE patients who had either smoked in the past or currently smoke. When pain is present and elevated, patients might turn to cigarettes as a means of reducing pain, which in turn could increase pain levels and reinforce smoking habits. Thus, health care providers could provide smoking cessation programs to help patients manage their symptoms better, and such interventions could incorporate pain management as a component of therapy.

6.3.3.1.2 Pruritus/Itch

Pruritus was a significant predictor of overall QoL in the SF-36 MCS model. This relationship was negative, as increasing scores on pruritus led to a decrease in mental health. This is contrary to findings from a study conducted in CLE patients.⁵⁵ However, findings from studies in other skin diseases, such as psoriasis and

dermatomyositis, have demonstrated the negative impact of pruritus on the mental dimension of QoL.^{331,342}

Experiencing pruritus may be a sign of increased disease activity and loss of control over the disease and could possibly be responsible for the decline in mental health. Potential management of pruritus might enhance patients' sense of control over CLE and its symptoms, which could invariably improve mental health.

6.3.3.1.2.1 *Factors Associated with Pruritus/Itch*

Similar to pain, disease activity and smoking status were positive predictors of pruritus/itch. Regarding disease activity, there is limited information on its association with pruritus. Unlike pain, disease activity has not been reported to have an association with pruritus.⁵⁵

Positive current and past smoking histories have been reported to increase systemic vascular inflammatory processes such as IL6,^{340,343} which can worsen some symptoms such as pruritus. As a result, patients could be counseled on the importance of smoking cessation to help ensure that symptoms such as pruritus are reduced.

6.3.3.1.3 Fatigue

Of all the predictor variables used in the four regression models, fatigue was the only significant variable across all models. Thus, it can be asserted that fatigue is a strong factor that affects both the physical and mental domains of QoL, which is consistent with research on fatigue and QoL.³⁴⁴⁻³⁴⁶ In addition, regardless of the

measure of QoL, fatigue still appears to have an impact on QoL. Determining how these patients are affected by fatigue and assessing their current experience with fatigue could lend understanding to the relevant domains (both physical and mental) underpinning QoL. Fatigue appears to be a distinct symptom which plays a large role in determining both the mental and physical handicaps that CLE patients experience. Fatigue could begin with a decline in physical activity, but can escalate to a wider range of negative effects that can leave patients feeling out of control and isolated, thereby impacting mental health.³⁴⁷ This vicious cycle can leave patient helpless and in a distressing position.³⁴⁷ As such, interventions that reverse the effect or onset of fatigue could have a positive effect of QoL. Therefore, clinical trials should consider incorporating fatigue measures as an assessment of QoL.

6.3.3.2 Functioning

Body image, a measure of functioning, was operationalized using the Body Image Scale (BIS). Body image was positively and significantly associated with overall QoL in both the CLEQoL models (mental and physical).

6.3.3.2.1 Body Image

The mean BIS score obtained in the current study was 8.78 (SD: 8.92; range: 0-30); which is within the range reported in other studies of diverse diagnoses (range of 4.27-14.22).^{289,348-351} Currently, there is no clinical cutoff for body image dissatisfaction, however, Hopwood et al.³⁵² suggested that values > 10 on the BIS can

be used as a threshold indicating body image dissatisfaction. Thus, our findings show that the participants in this current study experienced a lesser degree of body image dissatisfaction.

Body image was a positive significant predictor of both mental and physical health on the CLE-specific QoL measure. This means that patients with higher degrees of dissatisfaction with their body experienced poorer mental and physical health. These findings of the impact of body image on the two domains of QoL have been confirmed in other studies.^{350,353} The significant contribution of body image towards both mental and physical QoL could be because a majority of participants in this current study were female; this is consistent with previous study findings.³⁵⁰ Further, findings from a growing literature demonstrates that women experience more body dissatisfaction than men,³⁵⁴ which puts women at risk of adverse psychological consequences such as depression.³⁵⁵

Body image issues experienced by CLE patients may be also due to the cosmetic changes from irreversible skin damage. Currently, none of the QoL measures used in CLE patients examine body image. Our study findings underscore the importance of incorporating body image into QoL assessments. Visible changes such as dyspigmentation, hair loss, or scarring, can directly affect body image by altering a person's physical appearance, which could also cause self-esteem issues.³⁴⁸ Perhaps, these cosmetic changes experienced by CLE patients in addition to affecting mental health can also reduce physical functioning, leading to declines in physical health. Further, studies have shown that patients with skin diseases experience distress not only

from the disease but also from how others perceive them as a result of their appearance.^{31,32} Thus, dermatologic patients often have higher rates of mental health issues, like anxiety and depression than the general population.^{33-35,356-360} Therefore, QoL instruments in CLE studies should also incorporate other attributes such as body image to capture the disease effect and treatment impact on patients. The overarching goal of including body image measures should be to promote body acceptance, which may in turn positively impact QoL.

6.3.3.2.1.1 *Primary Drivers of Body Image*

The overall mean of body image was slightly lower than the cutoff recommended as the threshold for body image dissatisfaction.³⁵² Nonetheless, our findings suggest that patients with CLE experience some degree of body image dissatisfaction. The highest means achieved were on items referent to scarring (item j), physical attractiveness (item b), and self-consciousness (item c). For each of these items, more than 50 percent of the participants indicated being bothered by the cosmetic effects of CLE by some degree. These findings are supported by extant literature conducted in patients with skin diseases who are often bothered by their appearance.^{31,32} Scarring had the highest mean, which is contrary to findings in other studies using the BIS scale where most of these studies either omit this item or report low scores on it.^{348-350,353} A plausible explanation for this could be that most of these studies were conducted in patients with cancer, and as such scarring may have not been a very

relevant issue. However, in CLE patients, scarring has been documented in visible sites such as the face, and has been reported to be associated with impairment in QoL.^{361,362}

Since CLE can cause skin damage ranging from dyspigmentation and scarring to hair loss which leads to major changes in the physical appearance of patients, body image is therefore an important component of quality of life.²⁸⁹ These visible changes can affect body image by altering a person's physical appearance.^{363,364}

6.3.3.2.1.2 *Factors Associated with Body Image*

Pain, fatigue, and race/ethnicity were significant and positive predictors of body image, while social support was negatively related to body image. While no such findings have been reported in CLE patients, body image has been shown to be affected in other patients experiencing chronic pain.³⁶⁵⁻³⁶⁷ This association reported in the current study is therefore not surprising as some of the manifestations of CLE can cause painful lesions,⁵⁵ which often cause scarring and could lead to body image issues. These findings directly support the growing evidence that body image can be distorted in people with pain.^{365,366} The clinical implication of this finding is that given the relationship between body image and pain, the successful treatment of pain could improve body image in CLE patients.

Data from the current study also suggests that fatigue is related to body image dissatisfaction. Patients with higher levels of fatigue experienced more body image dissatisfaction. These findings may indicate that body image is a component of

patient well-being that depends on vitality and physical functioning.³⁶⁸ It is also plausible that body image dissatisfaction may signal increase in disease severity.

Regarding race/ethnicity, there were racial differences in body image dissatisfaction between African-American/Black vs other groups, with non-African-American/Black group reporting a higher degree of body image dissatisfaction. This finding is in congruence with a considerable body of research that reports that African-American/Blacks are more satisfied with their body appearance than people from other racial/ethnic groups.³⁶⁹⁻³⁷² There are no clear theories within the literature to explain these between-group racial differences in perception of body image.^{373,374} Nonetheless, it is imperative that the needs of non-African-American/Black CLE patients be met, to decrease disparities in body image satisfaction currently experienced by their African-American/Black counterparts. Specifically, these patients could be equipped with adequate social skills, as part of psychosocial interventions, which may be helpful when addressing comments or looks from others.³²⁸

Finally, social support was a negative and significant predictor of body image. Patients who received more support from their friends/family experienced lower levels of body image dissatisfaction. Studies have not generally investigated the relationships between body image and social support. It is logical to assume that patients with support from loved ones, perhaps in the form of encouragement and positive feedback, may help patients develop and maintain a positive body image. Future research is needed to more fully elucidate these relationships and their potential impact on overall QoL

6.3.3.3 Characteristics of the Individual

The two SF-36 models showed that race/ethnicity was the only significant predictor associated with overall QoL.

6.3.3.3.1 Description of Demographic Variables

Participants in this current study were predominantly female and middle-aged, which are consistent with the literature which shows that CLE affects females more disproportionately than males.^{21,49,73} Most of the patients in our study had chronic CLE, with DLE being the most common type; this could be because majority of our participants were African-American/Black who have higher prevalence rates of DLE.^{15,375}

6.3.3.3.2 Race/Ethnicity

Race/ethnicity had a significant, bi-directional relationship with overall QoL; while it was negative in the SF-36 MCS model, it was positive in the SF-36 PCS model. Regarding the MCS model, compared to African-American/Black patients with CLE, non-African-American/Black patients experienced lower mental health. Conversely, compared to African-American/black patients with CLE, non-African-American/Black patients had better physical health. This dynamic observed warrants further study as they are still unexplored in the literature. A better understanding of these specific demographic factors that affect mental and physical health can be areas of

opportunity for developing culturally-appropriate interventions that can improve the overall QoL of diverse CLE patients.

6.3.3.4 Characteristics of the Environment

Study results indicated that social support was a significant and positive predictor of mental health.

6.3.3.4.1 Social Support

Patients who received support from their family/friends had higher mental health scores than patients who did not. These findings show that social bonds and supportive relationships with friends and loved ones are essential to fostering better mental health. Bonds such as these can also be a protective factor from the effects of stress.³⁷⁶ Indeed, there is compelling evidence from the literature that receiving social support is significantly associated with mental well-being.³⁷⁷ Encouraging family members and friends to become more involved in the form of providing much-needed support may help to improve the QoL of patients. The concept of social support in chronic illness is not new and has been used in other settings.³⁷⁸⁻³⁸⁰ Such support systems may be useful in reducing the feelings of isolation, anxiety, depression and promoting better overall mental health in patients with CLE.

6.4 IMPLICATIONS FOR HEALTHCARE RESEARCH

Based on the results obtained from this current study, the SF-36 and the CLEQoL were concluded to be adequate measures of overall QoL in patients with CLE. However, the disease-specific measure, CLEQoL, was the better instrument as it had a higher predictive ability than the generic QoL measure, SF-36. The CLEQoL models exhibiting higher predictive ability than the SF-36 models could also mean that the former has better responsiveness and thus, recorded both clinical and subjective changes in CLE patients. To this end, clinicians and healthcare researchers might consider using disease-specific measures in QoL assessments in CLE patients. Physicians could also use the CLEQoL measure for routine monitoring of their patients' well-being; this can be attained by administering the survey at baseline and follow-ups.

Understanding the experiences of CLE patients, through the exploration of QoL constructs within a theoretical framework, provides healthcare providers with an understanding of the disease's impact on patients. In turn, healthcare providers can aid patients in their journey in the diagnosis to recovery continuum through empirically-guided expertise.

Focusing on only objective indicators (such as disease activity and damage, as typically measured within the CLASI), as it is mostly done in CLE QoL assessments, will not provide a complete and accurate estimate of QoL in CLE patients. Hence, physicians/clinicians caring for CLE patients should consider including subjective measures (such as body image) during their QoL assessments. Further, the CLEQoL

measure demonstrated adequate reliability in this current population and with continued use of this scale in future studies, construct validity can be ascertained.

Finally, this study has empirically tested associations that influenced QoL in CLE patients and lends support for further investigation of this patient outcome model. Focusing on QoL allows health outcomes researchers and clinicians to target concerns and issues that are relevant to the patient, especially as healthcare becomes more patient-centered. The model used in this study has provided a springboard for interventions that can be focused on health promotion, symptom management, and the alleviation of disease effects.

6.5 SUGGESTIONS FOR FUTURE RESEARCH

Due to the limitation of sample size in this current study, it is possible that some findings could have been significant in studies with larger and more diverse samples. Hence, future research could replicate this study in a larger and more heterogeneous sample of CLE patients to further assess QoL in CLE patients, specifically to better compare CLE subtypes. Perhaps, such replications will allow for exploration of other possible pathways within the Revised Wilson and Cleary Model and to fully test potential indirect relationships among the variables in the Revised Wilson and Cleary Model.

In chronic and disabling diseases, such as CLE, utilizing self-managing strategies (i.e., coping skills) have been demonstrated to reduce disease impact on

QoL.^{323,381-383} In this study, coping strategies adopted by CLE patients were not assessed. In order to elucidate the effect on QoL, future studies should consider including coping strategies as a potential correlate or mediating factor in QoL studies in CLE patients.

Due to sample size considerations, the present study included nine out of the initial 21 variables in the final regression model to represent antecedents of QoL in CLE patients. Future studies could explore the full model and assess its contribution in explaining overall QoL. Disease activity was initially correlated with QoL, which was consistent with past studies in CLE patients^{21,26,37,55,160} but this relationship ceased being significant in the final regression model. Further studies examining the plausible explanation of this finding may provide additional understanding.

None of the variables from the general health perceptions selected for this study were significant. Perhaps, additional factors relevant to CLE representing this construct need to be identified to yield greater insight into general health perceptions affecting QoL.

While the CLEQoL exhibited a higher predictive ability than the SF-36 in the current study, findings provided a cross-sectional view of examined relationships. Also, given that measures such as disease activity in CLE patients have been reported to fluctuate over time,³¹³ longitudinal studies are needed to examine the responsiveness of the CLEQoL to changes in skin disease activity in patients with CLE.

Finally, future studies could use a more robust methodology such as Structural Equation Modeling (SEM)³⁸⁴ to simultaneously test all of the casual relationships (total,

direct, and indirect) among the factors that comprise overall QoL. In addition to testing the validity of the model, SEM can be used to test the measurement model to determine how well the data collected fits the theoretical model. Given that CLE severity increases from its acute to its chronic form,⁵⁰ SEM could allow for testing with different CLE populations to determine if the model performs equally among the various CLE subgroups. SEM can also be used to build parsimonious models to identify weak relationships for deletion.

6.6 STUDY LIMITATIONS

Limitations are inevitable in studies designed to address research questions, and these limitations could have an impact on the overall study findings. This current study is not without its limitations and the hope is that by highlighting them, future researchers can use these to modify their studies accordingly.

A primary limitation of this study pertains to the generalizability of the findings. This study involved a convenience sample of patients with CLE, obtained from two outpatient clinics – University of Texas (UT) Southwestern Medical Center and Parkland Health and Hospital System – to increase the patient pool. It is, therefore, possible that our study population may not be representative of the CLE population as a whole. Second, it is also likely that participation in the survey may have been influenced by the nature of the relationship between a patient and their physicians/providers. Finally, some patients with CLE may have had other chronic

conditions (such as SLE) that may mimic some CLE symptoms and thus may have influenced their responses to survey items.

The relatively small sample size also posed an additional challenge. Limited sample size could have led to reduced statistical power to detect additional relationships among variables. The current study was based on a cross-sectional design, at a single point in the disease process. As a result, conclusions regarding changes in quality of life over time cannot be made. Therefore, longitudinal studies are needed for the examination of patients' overall QoL beginning from the stage of diagnosis through the CLE continuum of care. In addition, longitudinal analyses can be combined with latent curve and autoregressive models³⁸⁵ to support the causal relationships implied in the Revised Wilson and Cleary Model.

Since this was a study of the QoL in CLE patients at one period in time, responses provided by patients on the survey questions may have been reflective of their view at that particular time point. For example, patients with higher disease activity as at the time of the data collection could have provided responses based on their current experiences with CLE.

The study incorporates medical history variables and health status indicators which were obtained from medical chart reviews and registries. Hence, the errors in coding these secondary sources of information may have affected this current study. Some variables, for example fatigue, had longer recall periods than others. Thus, it is possible that variables with longer recall intervals may either over- or underestimate the

health state.³⁸⁶ Finally, social desirability is also a possible limitation, as patients may have provided biased responses on the QoL survey.

Despite these limitations, this project has some strength. One strength of the current study included the addition of some variables (such as body image) that have not been formally investigated before in patients with CLE. Another study strength is that it serves as a useful pilot study that explored the relationship between the constructs within the Revised Wilson and Cleary Model and investigated its utility in examining overall QoL in CLE patients. Results obtained from this study will be beneficial in designing future studies in this area.

6.7 CONCLUSIONS

This current study supports the utility of the Revised Wilson and Cleary Model in better understanding QoL in CLE patients. Several modifiable (e.g., pain, pruritus, fatigue, body image, and social support) and non-modifiable (e.g., race/ethnicity) factors were predictive of overall QoL in CLE patients and could be used to help health care providers interpret and assess QoL outcomes in CLE patients. Beginning with these modifiable factors, specific interventions can be customized to be responsive to CLE patients in improving the quality of their lives.

Of all the factors that predicted quality of life, variables associated with symptom status (pain, pruritus/itch, and fatigue) were the most important, contributing far more than other predictors especially the objective clinical indicators. Examining these measures in CLE patients could significantly aid patients in improving their QoL.

Furthermore, the findings of the study indicate that certain patients may be more affected, especially regarding their physical QoL (African-Americans/Blacks) and their mental QoL (non-African-Americans/Blacks). Therefore, attention is warranted in these areas for the development of culturally-relevant interventions.

Finally, this study integrated patient-centered and clinical measures which facilitated a fuller theoretically-based understanding of QoL issues in CLE patients. The Revised Wilson and Cleary Model has been widely used in other disease states but not in CLE patients. This study presents a first step in testing the utility and validity of this model in CLE patients.

Appendices

Appendix A – Focus Group Recruitment

Dear _____ (Participant Name),

Researchers at The University of Texas at Austin and The University of Texas Southwestern Medical Center are conducting a study to understand how cutaneous lupus erythematosus (CLE) affects the quality of life in patients. We are inviting you to participate because you had previously agreed to be contacted for future research in other study.

What is involved in this study? We are inviting patients who have a diagnosis of CLE based on diagnosis; are aged 18 years and above; and able to understand written and spoken English. You will be asked to participate in a 1 to 1.5 hour-long focus group session with 6 – 10 other patients with CLE. You will be asked open-ended questions to find out how CLE affects your overall QoL. You will receive monetary compensation for your participation.

How do I participate in this study? If you are interested in participating in this research project, please provide the following information to Motolani Ogunsanya at tmadedipe@utexas.edu or call [512-775-8720](tel:512-775-8720). To submit responses via email, please see below:

Name: _____

Best Contact Phone Number: _____

What is the best time to participate in a focus group (Please place an X by your responses)?

Time of week

Weekend _____

Weekday _____

Both weekend and weekday _____

Time of day

Evening _____

Day _____

Both, evening and day _____

Thank you and we look forward to hearing from you soon!

Sincerely,

Motolani Ogunsanya, B.Pharm, MS
Doctoral Candidate
College of Pharmacy
Health Outcomes and Pharmacy Practice
Division
The University of Texas at Austin

Benjamin Chong, MD
Assistant Professor
Department of Dermatology
University of Texas
Southwestern Medical Center

Appendix B – Brief Pre-Focus Group Survey

Quality of Life in Patients with Cutaneous Lupus Erythematosus (CLE)

Thank you for agreeing to be a part of this focus group study! Please read and answer the questions below carefully. Your answers are very important to us.

1. What is your gender?

☐ Male

☐ Female

2. In what year were you born? 19 ____

3. What was your age at diagnosis: ____

4. Which of the following best describes your racial background?

Caucasian

- ☐ Northern European (Swedish, Irish, German, Ukrainian)
- ☐ Southern European (Italian, Portuguese, Greek)
- ☐ Other European
- ☐ Unknown Ancestry

Asian

- ☐ Far East
- ☐ Southeast Asia
- ☐ Indian subcontinent
- ☐ Uncertain ancestry

Other

- ☐ African American
- ☐ American Indian/Alaska Native
- ☐ Middle Eastern
- ☐ Mixed Race
- ☐ Native Hawaiian/Pacific Islander
- ☐ North African
- ☐ Other_____

5. Which of the following best describes your ethnic background?

- ☐ Cuban
- ☐ Mexican American
- ☐ Puerto Rican
- ☐ Not Hispanic/Latino
- ☐ Other_____

6. Which of the following best describes the geographic residence where you grew up?

☐ Urban

☐ Suburban

☐ Rural

7. Which of the following best describes your marital status?

- ☐ Single, in a relationship
- ☐ Single, not in a relationship
- ☐ Married
- ☐ Partner/Living together
- ☐ Divorced/Separated
- ☐ Widowed

8. What is your highest level of education (current classification)?

- ☐ Less than High School
- ☐ High School Graduate or GED
- ☐ Freshman (College)
- ☐ Sophomore (College)
- ☐ Junior (College)
- ☐ Senior (College)
- ☐ Graduate Student
- ☐ Postgraduate (e.g., MD, PhD)
- ☐ Other (Please Specify) _____

9. How would you rate your overall health?

- ☐ Poor
- ☐ Fair
- ☐ Good
- ☐ Excellent

10. What type of health insurance do you have? (Check all that apply)

- ☐ Private insurance (e.g. BlueCross/Blue Shield, Humana)
- ☐ CHIP (Children's Health Insurance Plan)
- ☐ Medicare
- ☐ Medicaid
- ☐ No insurance/Self-pay
- ☐ Not sure
- ☐ Other (Please Specify) _____

11. Have you ever smoked cigarettes on a regular basis?

- ☐ Yes
- ☐ No

If "Yes" please answer the questions below

a. Do you smoke now?

- ☐ Yes
- ☐ No

b. If you currently smoke, how many packs per day? _____

THANK YOU FOR YOUR PARTICIPATION

Appendix C – Focus Group Moderator Guide

Introduction

Hi, my name is [Name] and I'll be your moderator today. Welcome to our focus group discussion.

The purpose of this focus group session is to talk with you about your how cutaneous lupus erythematosus (CLE) affects your overall quality of life. The information obtained from this focus group will be used to develop a survey that will be administered to a larger group of patients with CLE.

This session will be audio recorded. However, no names will be used for any portion of the larger study. Fake names will be used instead of your real names once I begin recording. Here are the name cards to place in front of you; these will be used to identify each of you from this point forward. Information obtained from this focus group session will not be associated with any specific focus group participant. The purpose of the audio recording during the focus group session ensures that all the important information is captured and is available for inclusion in the final questionnaire. The audio tapes will be stored in a locked file cabinet and will be used only by research personnel. This session is expected to last between 1 – 1.5 hours and you have the right to stop participating at any time.

Confidentiality is important and in any publications or presentations, I will make sure that you will not be identified in any way, by department, etc. Also, whatever is said in this room will not be shared with anyone other than the researchers for whom this conversation is being recorded. Remember that we will also assign you pseudonyms, so that your responses can remain anonymous. That's very important, so that everyone may speak freely.

Here's a copy of the **information sheet** that you may read.

To also get to understand your responses better, we will be collecting some information about you. Kindly take a few minutes to fill out this survey [**hands demographic survey questions to participants**] and put it back into the folder in the middle of the table.

Group Rules

As the session moderator, I will ask the questions and keep everyone on track. I will keep track of time, and therefore, I may need to interrupt the discussion to move forward in the interest of time. It is important that everyone feels comfortable and at ease during the discussion. There is no right or wrong answer to any of the questions. You are encouraged to speak freely about the issues discussed as everyone's input is valuable to the discussion.

The moderator will give participants a few minutes to write down answers to each question below and then discuss them as a group. Participants will be given a sheet of paper to record their response.

General Question

- 1. Briefly tell me/write down all the ways that CLE affects you.**
Probe: Kindly tell me how CLE affects your work life, daily activities, social life, personal relationships, leisure activities, or any other ways possible. Also tell me the impact of CLE on photosensitivity, alopecia, and your mental health.
- 2. Which other areas can you think of that has been affected by CLE?**
- 3. Now, please take a moment to review the questionnaires in front of you. Beginning with the first questionnaire labeled Skindex 29+3, what do you think about the items on this questionnaire as they pertain to CLE?**
Probe: Are they relevant to CLE? What other items can be added to it to make it more relevant to CLE?
- 4. Finally, please take a moment to review the other questionnaires in front of you. It is labeled as VitiQoL. What do you think about the items on this questionnaire as they pertain to CLE?**
Probe: Are they relevant to CLE? What other items can be added to it to make it more relevant to CLE?

Conclusion - We have covered the desired topics today. Do you have anything that you want to add with respect to what we talked about? Any final observations or comments? If not, then I would like to thank you for your time and participation. Please wait a few moments to receive your gift card in appreciation for your time and participation.

Appendix D – Skindex-29+3 Questionnaire

Instructions: These questions concern your feelings over the past 4 weeks about the **skin condition that has bothered you the most. Please check the answer that comes closest to the way you have been feeling.**

	NEVER	RARELY	SOMETIMES	OFTEN	ALL THE TIME
1. My skin hurts	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
2. My skin condition affects how well I sleep	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
3. I worry that my skin condition may be serious	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
4. My skin condition makes it hard to work or do hobbies	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
5. My skin condition affects my social life	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
6. My skin condition makes me feel depressed	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
7. My skin condition burns or stings	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
8. I tend to stay at home because of my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
9. I worry about getting scars from my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
10. My skin itches	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
11. My skin condition affects how close I can be with those I love	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
12. I am ashamed of my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
13. I worry that my skin condition may get worse	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
14. I tend to do things by myself because of my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
15. I am angry about my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
16. Water bothers my skin condition (bathing, washing hands)	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
17. My skin condition makes showing affection difficult	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
18. I worry about side-effects from skin medications/treatments*	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
19. My skin is irritated	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
20. My skin condition affects my interactions with others	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
21. I am embarrassed by my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
22. My skin condition is a problem for the people I love	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
23. I am frustrated by my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
24. My skin is sensitive	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
25. My skin condition affects my desire to be with people	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
26. I am humiliated by my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
27. My skin condition bleeds	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
28. I am annoyed by my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
29. My skin condition interferes with my sex life	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
30. My skin condition makes me tired	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
31. I worry about going outside because the sun might flare my disease	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
32. I am worried about my hair loss	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
33. My skin disease prevents me from doing outdoor activities.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

*Item will not be scored

Appendix E – VitiQoL Questionnaire

Instructions: The purpose of these questions is to assess whether the aspect of your skin affected your life during the last month, from 0 (not at all/ not applicable) to 5 (all the time):

	NOT AT ALL				ALL THE TIME
1. Have you been bothered by the appearance of your skin condition?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅
2. Have you felt frustrated about your skin condition?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅
3. Have your skin conditions made it hard to show affection?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅
4. Has your skin condition affected your daily activities?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅
5. When you were talking to someone, have you worried about what they may be thinking of you?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅
6. Have you been afraid that people will find fault with you?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅
7. Have you felt embarrassed or self-conscious because your skin?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅
8. Has your skin condition influenced the clothes you wear?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅
9. Has your skin condition affected your social or leisure activities?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅
10. Has your skin condition affected your emotional well-being?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅
11. Has your skin condition affected your overall physical health?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅
12. Has your skin condition affected your grooming practices (i.e., haircut, use of cosmetics)?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅
13. Has your skin condition affected your sun protection efforts during recreation (i.e., limiting exposure time during sun peak hours, seeking shade, wearing a hat, long sleeves or pants)?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅
14. Has your skin condition affected your chances of making new friends?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅
15. Have you worried about progression or spread of diseases to new areas of the body?	<input type="checkbox"/> ₀	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄ <input type="checkbox"/> ₅

Appendix F – CLEQoL Questionnaire

Instructions: These questions concern your feelings over the past 4 weeks about the **skin condition that has bothered you the most**. Please check the answer that comes closest to the way you have been feeling.

	NEVER	RARELY	SOMETIMES	OFTEN	ALL THE TIME
1. My skin hurts	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
2. My skin condition affects how well I sleep	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
3. I worry that my skin condition may be serious	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
4. My skin condition makes it hard to work or do hobbies	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
5. My skin condition affects my social life	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
6. My skin condition makes me feel depressed	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
7. My skin condition burns or stings	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
8. I tend to stay at home because of my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
9. I worry about getting scars from my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
10. My skin itches	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
11. My skin condition affects how close I can be with those I love	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
12. I am ashamed of my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
13. I worry that my skin condition may get worse	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
14. I tend to do things by myself because of my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
15. I am angry about my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
16. Water bothers my skin condition (bathing, washing hands)	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
17. My skin condition makes showing affection difficult	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
18. I worry about side-effects from skin medications/treatments*	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
19. My skin is irritated	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
20. My skin condition affects my interactions with others	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
21. I am embarrassed by my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
22. My skin condition is a problem for the people I love	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
23. I am frustrated by my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
24. My skin is sensitive	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
25. My skin condition affects my desire to be with people	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
26. I am humiliated by my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
27. My skin condition bleeds	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
28. I am annoyed by my skin condition	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
29. My skin condition interferes with my sex life	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
30. My skin condition makes me tired	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
31. I worry about going outside because the sun might flare my disease	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
32. I am worried about my hair loss.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
33. My skin condition prevents me from doing outdoor activities.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
34. When talking to someone, I sometimes worry about they may be thinking of me.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
35. My skin condition has influenced the clothes I wear.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
36. My skin condition has affected my grooming practices (i.e., haircut, use of cosmetics).	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
37. My skin condition has affected my sun protection efforts during recreation (i.e., limiting exposure time during sun peak hours, seeking shade, wearing a hat, long sleeves or pants).	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

*Item will not be scored

Appendix G – SF-36 Questionnaire

Instructions: This survey asks for your views about your health. This information will help keep track of how well you are able to do your usual activities.

Please check the box that corresponds to your choice using the scales listed below.

1. In general, how would you say your health is:				
Excellent	Very Good	Good	Fair	Poor
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. <u>Compared to one year ago</u> , how would you rate your health in general <u>now</u> ?				
Much better now than one year ago	Somewhat better now than one year ago	About the same	Somewhat worse now than one year ago	Much worse now than one year ago
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The following questions are about activities you might do during a typical day. Does **your health now limit you** in these activities? If so, how much?

	YES, limited a lot	YES, limited a little	NO, not limited at all
3. <u>Vigorous activities</u> , such as running, lifting heavy objects, participating in strenuous sports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. <u>Moderate activities</u> , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Lifting or carrying groceries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Climbing <u>several</u> flights of stairs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Climbing <u>one</u> flight of stairs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Bending, kneeling, or stooping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Walking <u>more than a mile</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Walking <u>several blocks</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Walking <u>one block</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Bathing or dressing yourself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

During the <u>past 4 weeks</u> , have you had any of the following problems with your work or other regular daily activities <u>as a result of your physical health?</u>	Yes	No
13. Cut down the <u>amount of time</u> you spent on work or other activities	<input type="checkbox"/>	<input type="checkbox"/>
14. <u>Accomplished</u> less than you would like	<input type="checkbox"/>	<input type="checkbox"/>
15. Were limited in the <u>kind</u> of work or other activities	<input type="checkbox"/>	<input type="checkbox"/>
16. Had <u>difficulty</u> performing the work or other activities (for example, it took extra effort)	<input type="checkbox"/>	<input type="checkbox"/>

During the past 4 weeks , have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?	Yes	No
17. Cut down the amount of time you spent on work or other activities	<input type="checkbox"/>	<input type="checkbox"/>
18. Accomplished less than you would like	<input type="checkbox"/>	<input type="checkbox"/>
19. Didn't do work or other activities as carefully as usual	<input type="checkbox"/>	<input type="checkbox"/>

20. During the past 4 weeks , to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?	Not at all <input type="checkbox"/>	Slightly <input type="checkbox"/>	Moderately <input type="checkbox"/>	Quite a bit <input type="checkbox"/>	Extremely <input type="checkbox"/>
21. How much bodily pain have you had during the past 4 weeks ?	None <input type="checkbox"/>	Very mild <input type="checkbox"/>	Mild <input type="checkbox"/>	Moderate <input type="checkbox"/>	Severe <input type="checkbox"/>
22. During the past 4 weeks , how much pain interferes with your normal work (including both work outside the home and housework)?	Not at all <input type="checkbox"/>	A little bit <input type="checkbox"/>	Moderately <input type="checkbox"/>	Quite a bit <input type="checkbox"/>	Extremely <input type="checkbox"/>

These questions are about how you feel and how things have been with you **during the past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the past 4 weeks...	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
23. Did you feel full of pep?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Have you been a very nervous person?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Have you felt so down in the dumps that nothing could cheer you up?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Have you felt calm & peaceful?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Did you have a lot of energy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Have you felt down-hearted and blue?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Did you feel worn out?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Have you been a happy person?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Did you feel tired?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

32. During the past 4 weeks , how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?				
All of the time	Most of the time	Some of the time	A little of the time	None of the time
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How TRUE or FALSE is each of the following statements for you					
	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
33. I seem to get sick a little easier than other people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. I am as healthy as anybody I know	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. I expect my health to get worse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. My health is excellent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix H – Consent to Participate in Research **(Cutaneous Lupus Erythematosus)**

Title of Research: Molecular Studies of Cutaneous Lupus

Funding Agency/Sponsor: University of Texas Southwestern Medical Center,
National Institutes of Health, Biogen Incorporated

Study Doctors: Benjamin F. Chong, MD

In case of questions, you may call these study doctors or research personnel during regular office hours at 214-648-3427. At other times, you may call them at 214-645-2400.

Instructions:

Please read this consent form carefully and take your time making a decision about whether to participate. As the researchers discuss this consent form with you, please ask him/her to explain any words or information that you do not clearly understand. The purpose of the study, risks, inconveniences, discomforts, and other important information about the study are listed below. If you decide to participate, you will be given a copy of this form to keep.

Why is this study being done?

This study is being done to help determine the cause of skin lesions in lupus. We believe that lupus has many different causes, including genetic, immunological, and environmental factors. We are trying to understand how all of these factors could cause or worsen disease. The information gathered from this study may lead to better diagnostic techniques and new medications that can treat your condition more effectively and safely.

Why am I being asked to take part in this research study?

You are being asked to take part in this study because you have signs and symptoms suggestive of lupus in the skin.

What is involved in the study?

If you agree to be in this study, you will be asked to sign this consent form and will have the following tests and procedures.

- **Questions:** A study doctor or research personnel will ask you questions about your skin disease, health, the health of your family members, medications you take for any health problems, and quality of life.
- **Samples of Blood:** At each visit, up to two to three tablespoons of blood will be drawn from a vein in your arm with a small sterile needle. This is the standard method used to obtain blood for routine hospital tests. We will be using this blood for research purposes including DNA analysis. We may ask for a second blood sample if the research laboratory cannot process the first sample. During this five-year study, up to thirty-three tablespoons of blood will be drawn.
- **Skin biopsy:** A study doctor will perform one or two punch biopsies in the affected and/or unaffected lupus skin. The areas to be biopsied will be injected with a local anesthetic, and then a piece of skin about the size of a pencil's eraser head will be removed. The area will be closed with sutures, and a bandage will be placed over the wound.
- **Medical Record:** You are also being asked for permission to obtain from your medical records information about your age, gender, race, age of diagnosis, disease location, personal and family history of autoimmune diseases, and past treatments that will make your tissue samples even more useful to the researchers.
- **Photography:** The photographs taken will not identify you, as your face will not be photographed. If your face is photographed, your eyes will be blacked out to protect your identity. The photographs will be used to determine if there has been improvement in your cutaneous lupus. If you do not wish to have the photographs taken, you can still participate in this research study. By initialing below you agree to have photographs taken of your lesion, and for these photographs to be used in future scientific publication. These photographs will not be used for promotional purposes.

I wish to be photographed as a part of this study.

Initial

Date

I do **NOT** wish to be photographed as a part of this study.

Initial

Date

By agreeing to participate in this research, you agree to be included in this research database. Investigators may use your health information for future research on various autoimmune diseases including genetic research. However, your personally identifiable information will never be released to researchers, so they will not know who you are or be able to contact you.

How long can I expect to be in this study?

You will have one main visit for this study. After this time, we will invite you to return up to ten more times on a semi-annual basis to evaluate any changes in your skin lupus. If the skin lupus is noted to have changed, or a new type is seen, the investigator will perform additional biopsies of the new sites.

While your direct participation in this study will be over once you have completed the procedures/visits described above, the DNA isolated from your blood/tissue sample may continue to be studied for many years. In many genetic studies, testing of the DNA may go on for very long periods of time. This is true because we are continually finding new genes that may be involved in lupus in the skin.

What are the risks of the study?

Questions

We will ask you questions about your health. However, you can skip any question that makes you uncomfortable.

Skin Biopsy

Possible risks of the skin biopsy include pain with anesthesia injection, bleeding, and scarring. Uncommon risks include infection and skin rashes from bandage and/or anti-bacterial ointment application.

Risks of Blood Drawing

Possible risks associated with drawing blood from your arm include minimal discomfort and/or bruising. Infection, excess bleeding, clotting, and/or fainting also are possible, although unlikely. You will have about two to three tablespoons of blood collected for this research study.

Unforeseen Risks and New Information

There may possibly be risks to your participation in this research, which the researchers do not know about now. You will be told if any new information becomes available during the study that could cause you to change your mind about continuing to participate or that is important to your health or safety.

Loss of Confidentiality

In general, when information is collected, there is a potential risk for loss of confidentiality. However, every effort will be made to keep your information confidential.

What to do if I have problems?

If you have unusual symptoms, pain, or any other problems while you are in the study, you should report them to the research staff right away. Telephone numbers where they

can be reached are listed on the first page of this consent form.

What are the possible benefits of this study?

There is no direct benefit for you to participate in this study. However, we hope the information learned from this study will benefit others with skin lupus in the future. Information gained from this research could lead to better treatment options for skin lupus.

Will I be contacted in the future?

You have the option to elect to be contacted in the future in order to obtain follow-up information or to ask you to take part in more research.

Yes _____initials No _____initials

If you elect “yes”, please call Benjamin Chong, MD at 214-648-3427 and maintain a current address and telephone number on file. Please notify Benjamin Chong, MD if your legal name changes.

What other options do I have?

You may choose to not participate in this study. If you decide not to take part in this research study, it will have no effect on your medical care.

Will I be paid if I take part in this research study?

Yes. A 10-dollar gift card will be awarded for your participation in this study.

Depending on the number of skin samples obtained for the study, you will be paid \$25.00 or \$50.00 in return for your participation in the study. There are no funds available to pay for transportation to and from the research center, lost time away from work and other activities, lost wages, or child care expenses.

How will I be paid?

You will be given the gift card upon signing the required consent form documentation and completing study visit documents and procedures.

If skin samples are obtained, you will be issued a UT Southwestern Greenphire ClinCard, which can be used as a credit or debit card. You will also receive instructions on how to use the card. In order to receive study payments, your name, address, date of birth and Social Security Number (SSN) will be collected from you by the research staff. All information will be stored in a secure fashion and will be deleted from the UT Southwestern Greenphire ClinCard system once the study has been completed.

Important Information about Study Payments

1. Your SSN is needed in order to process your payments. Should you decide not to provide your SSN, your study participation payment will decrease at the current IRS tax rate. Study payments are considered taxable income and are reportable to the IRS.
2. An IRS Form 1099 will be sent to you if your total payments are \$600 or more in a calendar year.
3. Your information will not be shared with any third parties and will be kept completely confidential.

This information will remain confidential unless you give your permission to share it with others, or if we are required by law to release it.

If you are an employee of UT Southwestern, your payment will be added to your regular paycheck and income tax will be deducted. You will not receive a ClinCard.

UT Southwestern, as a State agency, will not be able to make payments to you for your participation in this research if the State Comptroller has issued a “hold” on all State payments to you. Such a “hold” could result from your failure to make child support payments or pay student loans, etc. If this happens, UT Southwestern will be able to pay you for your taking part in this research 1) after you have made the outstanding payments and 2) the State Comptroller has issued a release of the “hold.”

Will my insurance provider or I be charged for the costs of any part of this research study?

No. Neither you, nor your insurance provider, will be charged for anything done only for this research study (i.e., the Screening Procedures, Experimental Procedures, or Monitoring/Follow-up Procedures described above).

However, the expenses for routine health check-ups or standard medical care for your any medical problem (care you would have received whether or not you were in this study) is your responsibility (or the responsibility of your insurance provider or governmental program). You will be charged, in the standard manner, for any procedures performed for your standard medical care.

What will happen if I am harmed as a result of taking part in this study?

It is important that you report any suspected study-related illness or injury to the research team listed at the top of this form immediately.

Compensation for an injury resulting from your participation in this research is not available from The University of Texas Southwestern Medical Center at Dallas and

Parkland Health & Hospital System.

You retain your legal rights during your participation in this research.

Will my information be kept confidential?

Information about you that is collected for this research study will remain confidential unless you give your permission to share it with others, or as described below. You should know that certain organizations that may look at and/or copy your medical records for research, quality assurance, and data analysis include:

- UT Southwestern Medical Center at Dallas
- Parkland Health and Hospital System
- Representatives of domestic and foreign government and regulatory agencies, like the Food and Drug Administration (FDA), involved in keeping research safe for people
- UT Southwestern Institutional Review Board
- National Institutes of Health
- Biogen Incorporated
- University of Pennsylvania

In addition to this consent form, you will be asked to sign an "Authorization for Use and Disclosure of Protected Health Information." This authorization will give more details about how your information will be used for this research study, and who may see and/or get copies of your information.

To help us further protect the information the investigators have obtained a Certificate of Confidentiality from the U.S. Department of Health and Human Services (DHHS). This Certificate adds special protections for research information that identifies you and will help researchers protect your privacy. This Certificate does not mean the government approves or disapproves of our project.

For more information about the Certificate of Confidentiality, please read “More Information about This Research” at the end of this consent form.

Whom do I call if I have questions or problems?

For questions about the study, contact Benjamin Chong, MD, at 214-648-3427. In case of an emergency, please call 214-645-2400.

For questions about your rights as a research participant, contact the UT Southwestern Institutional Review Board (IRB) Office at 214-648-3060.

SIGNATURES:

YOU WILL HAVE A COPY OF THIS CONSENT FORM TO KEEP.

Your signature below certifies the following:

- You have read (or been read) the information provided above.
- You have received answers to all of your questions and have been told who to call if you have any more questions.
- You have freely decided to participate in this research.
- You understand that you are not giving up any of your legal rights.

Participant's Name (printed)

Participant's Signature

Date Time:
AM/PM

Name of person obtaining consent (printed)

Signature of person obtaining consent

Date Time:
AM/PM

Appendix I - Survey of Quality of Life (QoL) in Patients with Cutaneous Lupus Erythematosus (CLE)

We are interested in understanding more about how CLE affects your quality of life. The results of this survey will be compiled and reported in aggregate as part of an effort to identify the factors that affect your quality of life. We do not have any identifying information linking you to your responses.

Section I. Quality of Life – Question 1-11

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. *Thank you for completing this survey!*

For each of the following questions, please mark an ☐ in the one box that best describes your answer.

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
▼	▼	▼	▼	▼
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

2. Compared to one year ago, how would you rate your health in general now?



Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
▼	▼	▼	▼	▼
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

3. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	Yes, limited a lot	Yes, limited a little	No, not limited at all
	▼	▼	▼
a <u>Vigorous activities</u> , such as running, lifting heavy objects, participating in strenuous sports	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
b <u>Moderate activities</u> , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
c Lifting or carrying groceries.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃

- d Climbing several flights of stairs.....☐1.....☐2.....☐3
- e Climbing one flight of stairs.....☐1.....☐2.....☐3
- f Bending, kneeling, or stooping.....☐1.....☐2.....☐3
- g Walking more than a mile.....☐1.....☐2.....☐3
- h Walking several blocks.....☐1.....☐2.....☐3
- i Walking one block.....☐1.....☐2.....☐3
- j Bathing or dressing yourself.....☐1.....☐2.....☐3

4. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

Yes	No
	

- a Cut down on the amount of time you spent on work or other activities.....☐1.....☐2
- b Accomplished less than you would like.....☐1.....☐2
- c Were limited in the kind of work or other activities.....☐1.....☐2
- d Had difficulty performing the work or other activities (for example, it took extra effort)☐1.....☐2

5. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

Yes	No
	

- a Cut down on the amount of time you spent on work or other activities.....☐1.....☐2
- b Accomplished less than you would like☐1.....☐2
- c Did work or other activities less carefully than usual.....☐1.....☐2

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

7. How much bodily pain have you had during the past 4 weeks?

None	Very mild	Mild	Moderate	Severe	Very Severe
▼	▼	▼	▼	▼	▼
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆

8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks...

All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼	▼

- a Did you feel full of pep?.....☐₁.....☐₂.....☐₃.....☐₄.....☐₅.....☐₆
- b Have you been a very nervous person?.....☐₁.....☐₂.....☐₃.....☐₄.....☐₅.....☐₆
- c Have you felt so down in the dumps that nothing could cheer you up?.....☐₁.....☐₂.....☐₃.....☐₄.....☐₅.....☐₆
- d Have you felt calm and peaceful?...☐₁.....☐₂.....☐₃.....☐₄.....☐₅.....☐₆
- e Did you have a lot of energy?.....☐₁.....☐₂.....☐₃.....☐₄.....☐₅.....☐₆

f Have you felt downhearted and blue?.....☐1.....☐2.....☐3.....☐4.....☐5.....☐6

g Did you feel worn out?.....☐1.....☐2.....☐3.....☐4.....☐5.....☐6

h Have you been a happy person?....☐1.....☐2.....☐3.....☐4.....☐5.....☐6

i Did you feel tired?☐1.....☐2.....☐3.....☐4.....☐5.....☐6

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

11. How TRUE or FALSE is each of the following statements for you?

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
▼	▼	▼	▼	▼

a I seem to get sick a little easier than other people.....☐1.....☐2.....☐3.....☐4.....☐5

b I am as healthy as anybody I know.....☐1.....☐2.....☐3.....☐4.....☐5

c I expect my health to get worse.....☐1.....☐2.....☐3.....☐4.....☐5

d My health is excellent.....☐1.....☐2.....☐3.....☐4.....☐5

SECTION II. Skin condition and CLE– Question 12a-12kk

These questions concern your feelings over the past 4 weeks about **the skin condition that has bothered you the most**.

Please check the answer that comes closest to the way you have been feeling.

12.	Never	Rarely	Sometimes	Often	All of the time
a. My skin hurts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. My skin condition affects how well I sleep.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. I worry that my skin condition may be serious.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. My skin condition makes it hard to work or do hobbies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. My skin condition affects my social life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. My skin condition makes me feel depressed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. My skin condition burns or stings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. I tend to stay at home because of my skin condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. I worry about getting scars from my skin condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. My skin itches.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. My skin condition affects how close I can be with those I love.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l. I am ashamed of my skin condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m. I worry that my skin condition may get worse.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
n. I tend to do things by myself because of my skin condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o. I am angry about my skin condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
p. Water bothers my skin condition (bathing, washing hands).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
q. My skin condition makes showing affection difficult.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
r. I worry about side-effects from skin medications/treatments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
s. My skin is irritated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
t. My skin condition affects my interactions with others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
u. I am embarrassed by my skin condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
v. My skin condition is a problem for the people I love.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
w. I am frustrated by my skin condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
x. My skin is sensitive.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
y. My skin condition affects my desire to be with people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
z. I am humiliated by my skin condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
aa. My skin condition bleeds.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
bb. I am annoyed by my skin condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

cc. My skin condition interferes with my sex life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
dd. My skin condition makes me tired.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ee. I worry about going outside because the sun might flare my disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ff. I am worried about my hair loss.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
gg. My skin disease prevents me from doing outdoor activities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
hh. When talking to someone, I sometimes worry about they may be thinking of me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ii. My skin condition has influenced the clothes I wear.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
jj. My skin condition has affected my grooming practices (i.e., haircut, use of cosmetics).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
kk. My skin condition has affected my sun protection efforts during recreation (i.e., limiting exposure time during sun peak hours, wearing a hat, long sleeves or pants).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section III. Symptoms Associated With CLE – Question 13-15

Next, we would like to understand how some symptoms relevant to your CLE impact you.

Please circle the one number on the scale that best answers the question.

13. On average, how much **PAIN** have you experienced in the **last 24 hrs**?

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

No pain

Pain as bad as
you can imagine

14. On average, how much **ITCH** have you experienced in the **last 24 hrs**?

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

No itch

Itch as bad as
you can imagine

15. On average, how much **FATIGUE** have you experienced in the **past week**?

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

No fatigue

Fatigue as bad
as you can imagine

Section IV. Functioning with CLE – Question 16-19

In this section, we would like to know how you feel about your appearance, and about any changes that may have resulted from your CLE or treatment.

Please check the answer that comes closest to the way you have been feeling about yourself, during the past week.

16.	Not at all	A little	Quite a bit	Very much	
a. Have you been feeling self-conscious about your appearance?					
b. Have you felt less physically attractive as a result of your disease or treatment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c. Have you been dissatisfied with your appearance when dressed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d. Have you been feeling less feminine/masculine as a result of your disease or treatment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e. Did you find it difficult to look at yourself naked?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f. Have you been feeling less sexually attractive as a result of your disease or treatment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
g. Did you avoid people because of the way you felt about your appearance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
h. Have you been feeling the treatment has left your body less whole?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
i. Have you felt dissatisfied with your body?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Not at all	A little	Quite a bit	Very Much	Not applicable
j. Have you been dissatisfied with the appearance of your scar?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. Have you been diagnosed (by a professional) with depression

☐ Yes

☐ No

If "No," skip to Question 19.

18. Are you currently being treated for depression?

☐ Yes

☐ No

19. History of other Medical Conditions

Instructions: Answer No or Yes in the first column for ALL problems listed.

	#1: Do you have the problem?		#2: Do you receive medications or other treatment for it?	#3: Does it limit your activities?
a) Heart disease	<input type="checkbox"/> No <input type="checkbox"/> Yes	<i>if "Yes" →</i>	<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
b) High blood pressure	<input type="checkbox"/> No <input type="checkbox"/> Yes		<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
c) Lung disease	<input type="checkbox"/> No <input type="checkbox"/> Yes		<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
d) Diabetes	<input type="checkbox"/> No <input type="checkbox"/> Yes		<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
e) Ulcer or stomach disease	<input type="checkbox"/> No <input type="checkbox"/> Yes		<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
f) Kidney disease	<input type="checkbox"/> No <input type="checkbox"/> Yes		<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
g) Liver disease	<input type="checkbox"/> No <input type="checkbox"/> Yes		<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
h) Anemia or other blood disease	<input type="checkbox"/> No <input type="checkbox"/> Yes		<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
i) Cancer	<input type="checkbox"/> No <input type="checkbox"/> Yes		<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
j) Depression	<input type="checkbox"/> No <input type="checkbox"/> Yes		<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
k) Osteoarthritis, Degenerative arthritis	<input type="checkbox"/> No <input type="checkbox"/> Yes		<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
l) Back pain	<input type="checkbox"/> No <input type="checkbox"/> Yes		<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
m) Rheumatoid arthritis	<input type="checkbox"/> No <input type="checkbox"/> Yes		<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
n) Hepatitis	<input type="checkbox"/> No <input type="checkbox"/> Yes		<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes
o) HIV	<input type="checkbox"/> No <input type="checkbox"/> Yes		<input type="checkbox"/> No <input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Yes

Section V. General Health Perceptions of CLE – Question 20-21

Next, we would like to understand your views about the effect of CLE and its treatment on your health. There are no right or wrong answers.

Please check the answer that corresponds to your choice using the scales listed below.

20. In the past <u>four weeks</u> , how <u>often</u> did you experience the following <u>due to your CLE</u> ?						
	None of the time	A little of the time	Some of the time	Most of the time	All of the time	Not applicable
a. Serious side effects associated with CLE medications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Concerns about the number of medications you currently take for your CLE.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. Estimate your **SKIN-RELATED HEALTH** on a 1-10 scale as you see it **today**?

Please circle the one number on the scale that best answers the question.

0	1	2	3	4	5	6	7	8	9	10
Worst skin					Perfect health (i.e., total body burn)					

Section VI. Patient Demographic and Personal Characteristics – Questions 22-29

Now, we would like to know a little about you so we can better understand your responses.

Please check the answer that corresponds to your choice or by writing in your response where appropriate.

22. In what year were born? 19____ (please use a two digit number)

23. What is your gender?

☐ Male

☐ Female

24. What is your highest level of education?

☐ Lower than High School

☐ High School

☐ College

☐ Graduate Degree

25. Which of the following best describes your racial/ethnic background?

☐ African American

☐ Asian

☐ Caucasian

☐ Hispanic

☐ Other _____

26. Have you ever smoked cigarettes on a regular basis?

☐ Yes

☐ No

If "No," skip to Question 27.

a. Do you smoke now?

☐ Yes

☐ No

27. Which of the following best describes your marital status?

☐ Single

☐ Widowed

☐ Divorced

☐ Separated

☐ Married/Domestic Partner

28. Which is your current zip code? _____

29. Finally, please rate the level of support that you receive from your loved ones using the item below:

Generally, I receive support from friends and/or family...					
None of the time <input type="checkbox"/>	A little of the time <input type="checkbox"/>	Some of the time <input type="checkbox"/>	Most of the time <input type="checkbox"/>	All of the time <input type="checkbox"/>	Not applicable <input type="checkbox"/>

THANK YOU FOR YOUR PARTICIPATION!

Appendix J - Histograms of Residuals from Regression Analysis

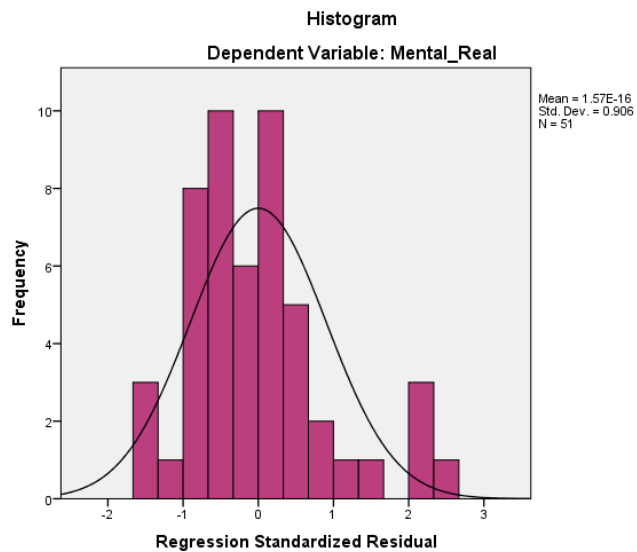


Figure J.1: Histogram of Standardized Residuals from Regression of CLEQoL-Mental and Other Independent Variables

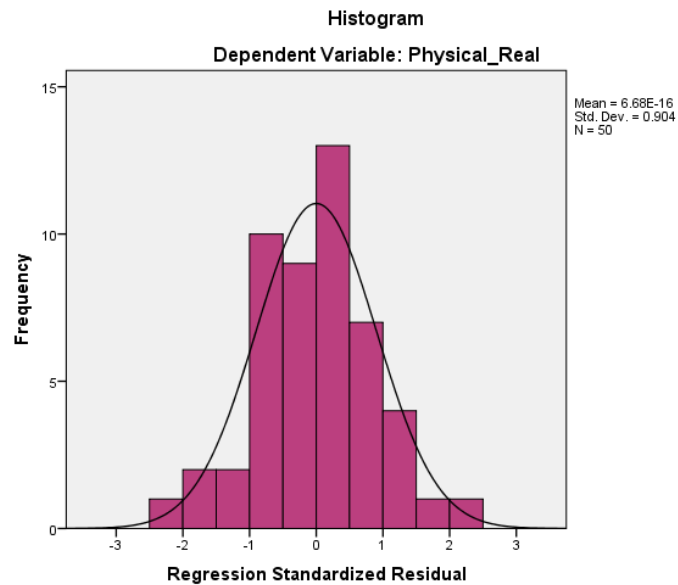


Figure J.2: Histogram of Standardized Residuals from Regression of CLEQoL-Physical and Other Independent Variables

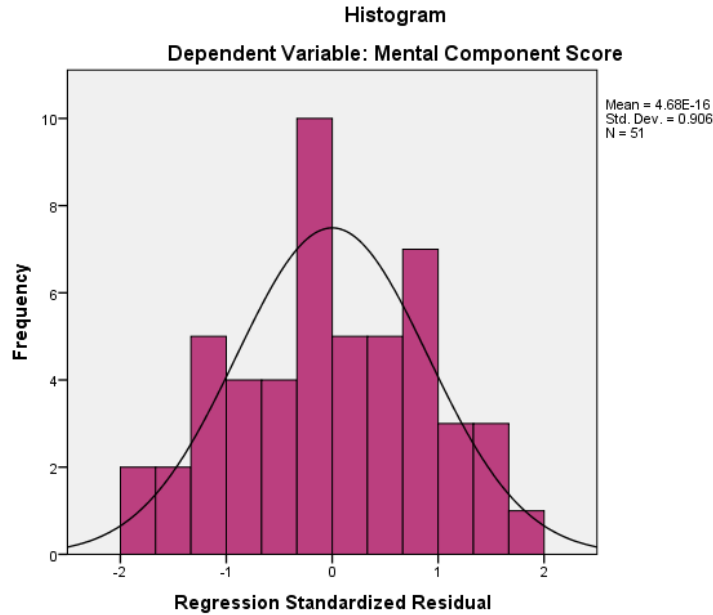


Figure J.3: Histogram of Standardized Residuals from Regression of SF-36 Mental Component Summary (MCS) and Other Independent Variables

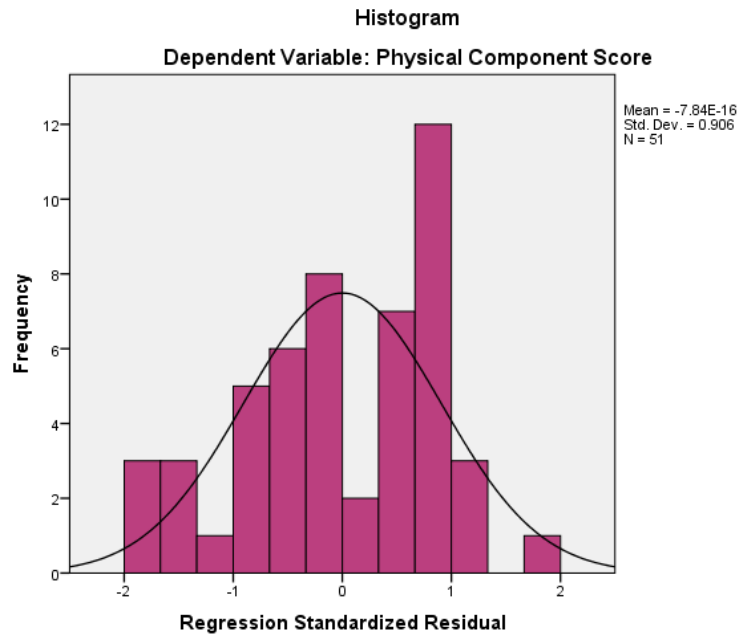


Figure J.4: Histogram of Standardized Residuals from Regression of SF-36 Physical Component Summary (PCS) and Other Independent Variables

Appendix K – Normality Probability Plots

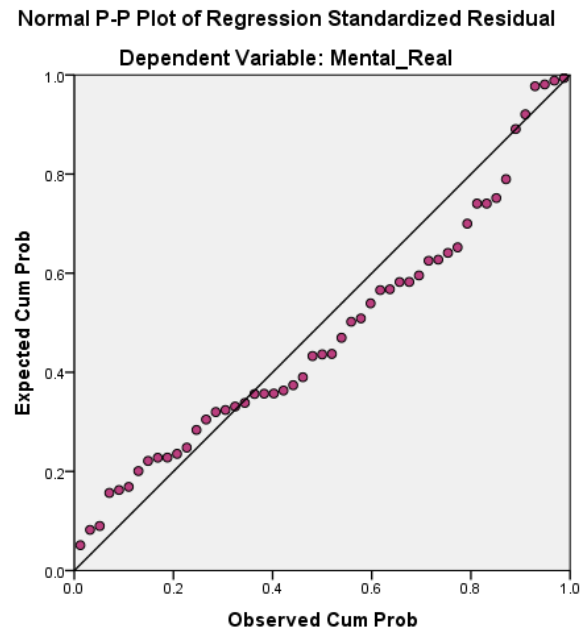


Figure K.1: Normal P-Plot of Regression of Standardized Residuals from Regression of CLEQoL-Mental and Other Independent Variables

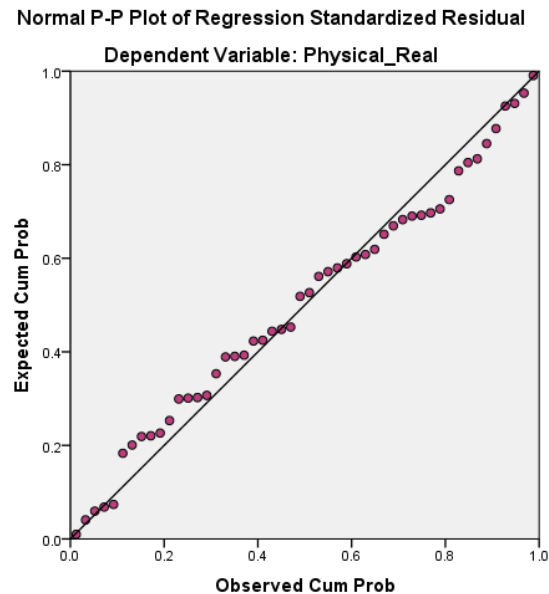


Figure K.2: Normal P-Plot of Regression of Standardized Residuals from Regression of CLEQoL-Physical and Other Independent Variables

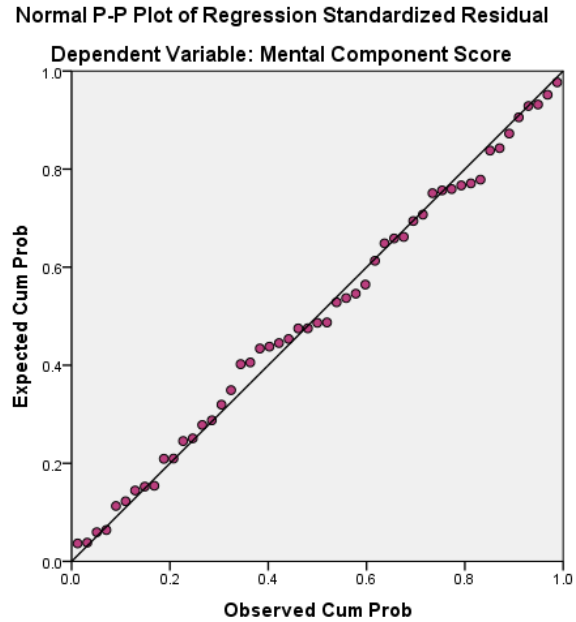


Figure K.3: Normal P-Plot of Regression of Standardized Residuals from Regression of SF-36 – Mental Component Summary (MCS) and Other Independent Variables

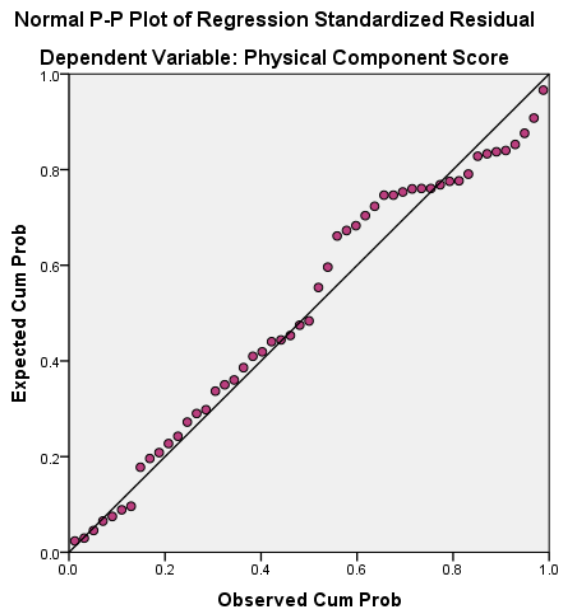


Figure K.4: Normal P-Plot of Regression of Standardized Residuals from Regression of SF-36 – Physical Component Summary (PCS) and Other Independent Variables

Appendix L - Scatter Plots of Residuals

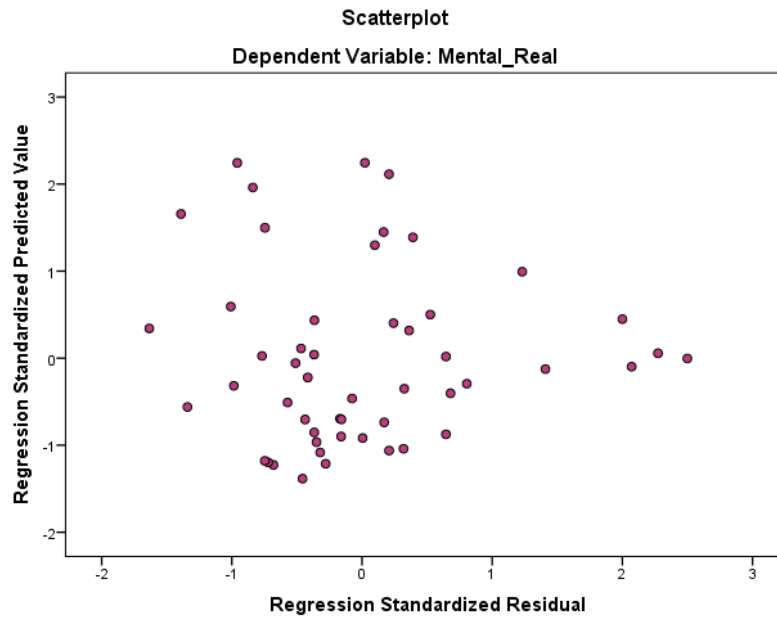


Figure L.1: Scatterplot of Residuals from Regression of Standardized Residuals from Regression of CLEQoL-Mental and Other Independent Variables

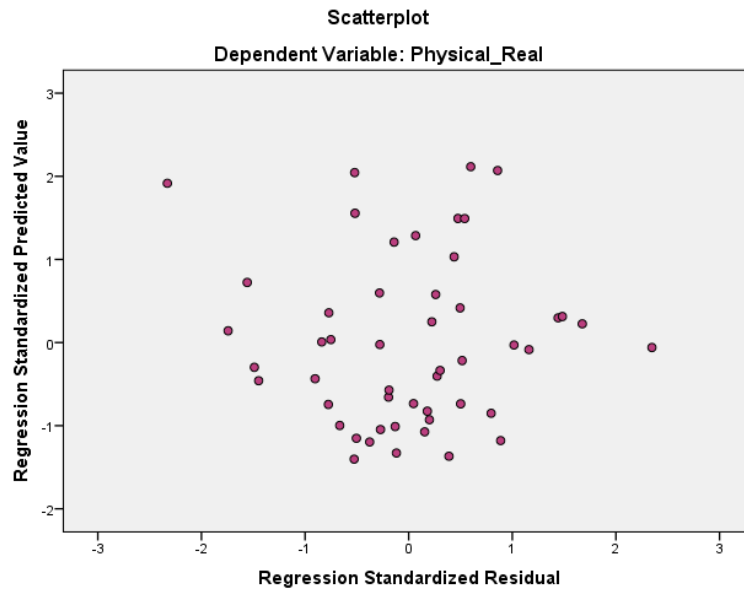


Figure L.2: Scatterplot of Residuals from Regression of Standardized Residuals from Regression of CLEQoL-Physical and Other Independent Variables

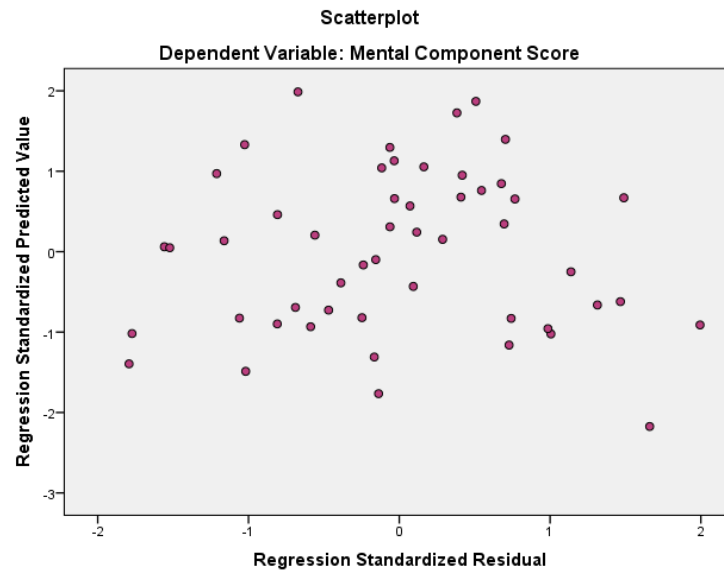


Figure L.3: Scatterplot of Residuals from Regression of Standardized Residuals from Regression of SF-36 – Mental Component Summary (MCS) and Other Independent Variables

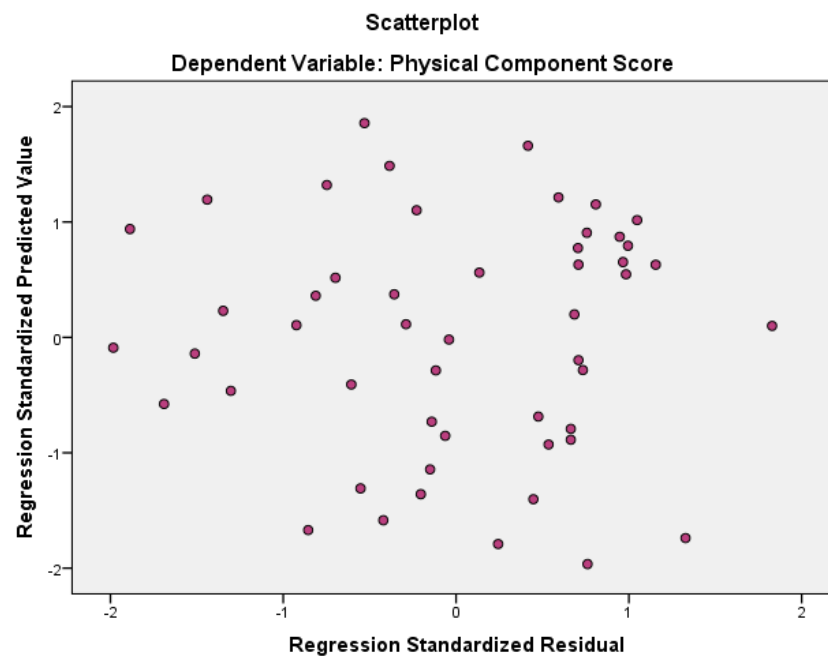


Figure L.4: Scatterplot of Residuals from Regression of Standardized Residuals from Regression of SF-36 – Physical Component Summary (PCS) and Other Independent Variables

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VITA

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